THE OTB

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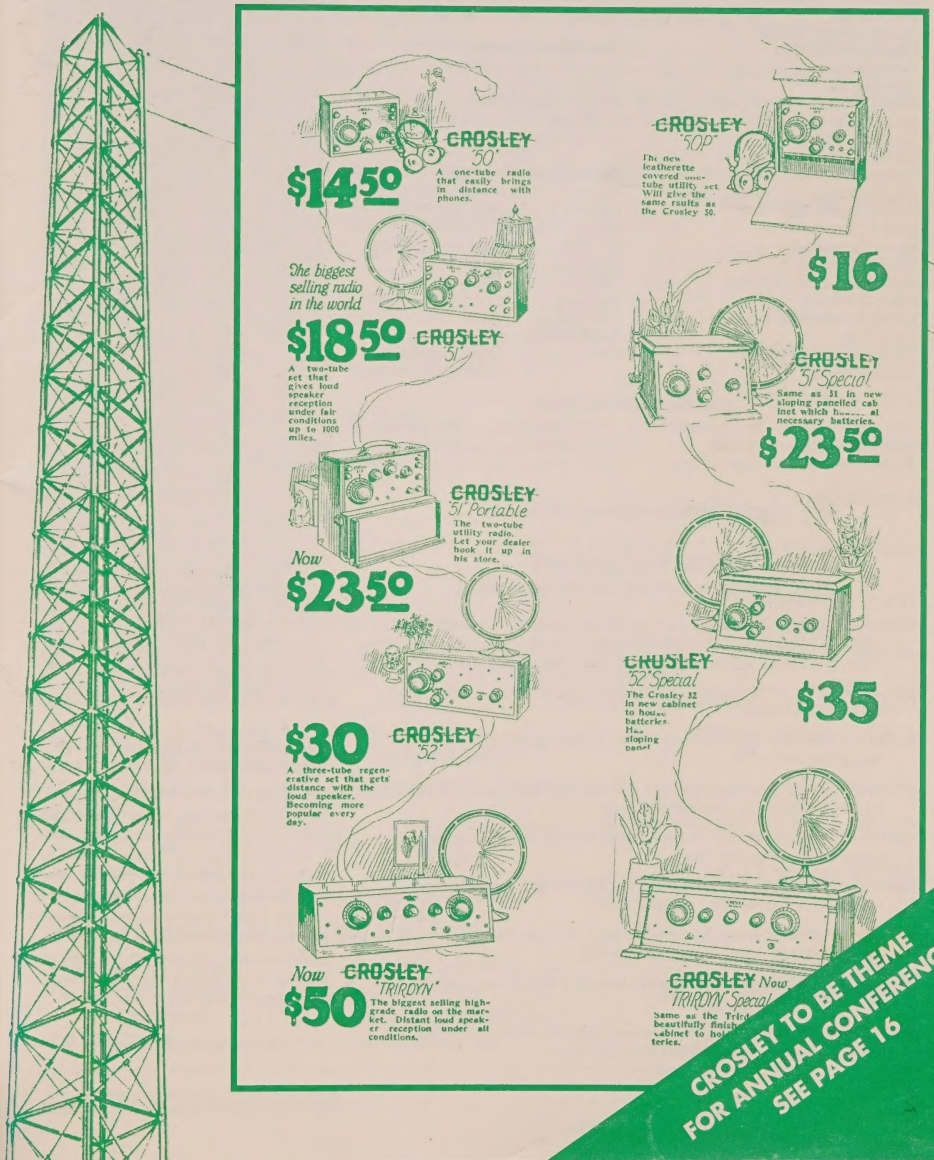
OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the collector, historian and old-time radio operator



CROSLEY TO BE THEME FOR ANNUAL CONFERENCE SEE PAGE 16

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.
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CONTENTS

CONFERENCE PREVIEW

16 **Rochester Conference 2000** ..... **Staff**
The accommodations, the seminars and those all-important contest categories.

FEATURE ARTICLES

25 **Coherers Revisited** ..... **H. Richard Crane, Ph.D.**
A career in research behind him, Professor Crane picks up a project begun in the 1920s.

28 **Restoring Atwater Kent Power Packs** ..... **D.K. Owens**
No need to be daunted by all that tar!

32 **A Structured Approach to Fixing Up Those Nice Old Radios -2-** ..... **Bill Fizette, W2DGB**
Your work area...Tools...And some philosophy about what and what not to do.

36 **Building an "All Japanese Five" Superheterodyne Receiver** ..... **Koji Watanabe**
Allied GHQ said "no more regenerative sets," and Japanese tube manufacturers complied.

44 **Dr. Ralph "Doc" Muchow 1917-2000: A Friend Gone But Not Forgotten** ..... **Art Bilski**
The famed museum is dark, but "The Doctor" won't ever be forgotten.

57 **Early Australian Valves** ..... **Fin Stewart**
Some insights into the early days of vacuum tube manufacture "down under."

47 **Memories of a VOA Visit** ..... **William N. Coffey, W2PIX**
A highway sign spotted by chance leads to a fascinating station tour.

58 **The AC-DC Receiver** ..... **Hank Olson, W6GXN**
From ballast resistors to the "All American Five"—and beyond.

COLUMNS

21 **Mikes and Men** ..... **George A. Freeman**
The Mic: RCA Type 1 The Man: Bob Paquette.

22 **Below 535** ..... **Frank Lotito, K3DZ**
LF Antennas, But More Like Tiny Stubs

35 **The Loudspeaker** ..... **Floyd A. Paul, W6THU**
Teletone Horn Speakers

39 **On the Internet** ..... **Chuck Schwark**
Newsgroups and Forums

48 **Television** ..... **Richard Brewster**
Operating the TRK-12

50 **Breadboarding** ..... **Richard A. Parks**
Regenerative Detectors—Another Version

52 **Key and Telegraph** ..... **Roger W. Reinke**
The Wireless Specialty Apparatus Company, By Russell Kleinman, WA5Y

54 **New Books and Literature** ..... **William E. Denk, W3IGU**

55 **The Communications Receiver** ..... **William Fizette, W2DGB**
A National Company Desk Mounted Radio Station

60 **Recent Radio, TV and Entertainment Obituaries** ..... **Charles S. Griffen, W1GYR**

63 **The Vacuum Tube** ..... **Bro. Patrick Dowd, F.S.C., W2GK**
RCA's "Special Red" 10,000-Hour Tubes

70 **Amateur Radio** ..... **John F. Rollins, W1FPZ**
Results of the 2000 Linc Cundall Memorial Contest

DEPARTMENTS/CLUB NEWS

4 President's Message
4 Letters to the Editor
5 From the Editor
9 AWA News
15 AWA Review Vol. 12
54 Silent Keys
56 About Our Authors
66 Classified Ads
73 Business Card Ads
75 *OTB* Back Issue Ordering Information
76 The Museum — Back Cover

THE PRESIDENT'S MESSAGE

It is spring again, and as I write this the summer season of meets has already begun. The Carolinas Chapter of the AWA, as just one example, had a very successful affair in Charlotte, NC on March 23-25. As the warm weather moves north, most of us will have our own little regional meets in the weeks ahead. Look in Antique Radio Classified and *The OTB* for the announcements, and for the reports of meetings past.

Speaking of The CC AWA, this very active group under the aggressive and able leadership of Ron Lawrence has met the basic requirements for Chapter status, as established by our revised By-Laws at the November AWA Board meeting, and we have granted to them official recognition as such. We currently have a list of groups who are desirous of affiliating with us, and we will be contacting them shortly with the details.

Ron and the team who run the CC AWA group are volunteers, as are most of the people who see to the myriad details of similar organizations. And that includes the AWA itself. Most of us donate our time and even personal funds to keep the organization alive. This includes the officers and board members, the contributors to the *OTB*, the museum workers under Curator Ed Gable (who himself has been putting in over a hundred hours a month), our former presidents who continue to be active, and a relatively new *OTB* columnist who is also our Web Page Administrator—Chuck Schwark, to name just a few.

Chuck, who is Chief Engineer for Corplex Television of Northfield IL, is also a professional free-lance web page designer. He has freely donated his time and expertise to create a wonderful AWA web page. If you haven't seen it, please take a good look. Located at www.antiquewireless.org, it is updated at least once a quarter.

Chuck's monthly activity reports show a steady increase in interest. For example, from January 29 through February 19, the main page averaged 50 hits per day from people the world over who want to learn more about us.

In closing, a resounding vote of thanks to Brother Pat Dowd, who is retiring from his long-running tube column. He will be replaced by Lud Sibley, author and publisher of the definitive *Tube Lore*, who must be considered as one of the world experts on vacuum tubes. Best wishes to both!

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB *staff or the Antique Wireless Association.*

NEEDED: RESTORATION LORE

I was somewhat taken by surprise when I read in the Feb 2000 *OTB* "From The Editor" that there had been no contributions for the *Equipment Restoration* column. Amazing! I would assume that the OT and Classic Boat Anchor collectors out there (who seem to be doing a lively business, at least on the Internet) would have material up the kazoo on how they were attempting to put their recent finds back into working order! Maybe today's collector is derived from the "new legion of electronic buffs" that disdains all contact with what is happening behind the front panel, and is only interested in the exterior cosmetic appeal? Hopefully not.

I'd like to suggest two somewhat related topics for future columns. These topics are based on my belief that there is not an antique or classic "band/function switched" rig out there where the switch can be simply serviced and fully restored just with a squirt of "canned computer grade air" or "sissy contact cleaner-lubricant!"

Topic 1: How do you clean a band or function switch? There are all sorts of "switch and contact cleaners" promising excellent first time results. In my opinion, the cleaners with a lubricant are expensive dirt magnets; the cleaners without a lubricant are just expensive rubbing alcohol! For those items that cannot be disassembled to fully expose their switching and/or wip-

FROM THE EDITOR

As Bill Fizette observes in his "President's Message," we are about to lose a very well known and knowledgeable Contributing Editor: Brother Pat Dowd, our vacuum tube columnist. Brother Pat took over tube editorship at *The OTB* in 1983, replacing Lauren Peckham, who that year became AWA's president. Pat has held the position ever since, but this issue contains his last column. He was the recipient of AWA's Tyne Tube Award in 1980, Houck Preservation Award in 1983, and Bruce Kelly-*OTB* Award last year.

Replacing Brother Pat is vacuum tube historian Lud Sibley. Lud is a past editor of both *The OTB* and *The AWA Review* and currently edits the Tube Collector's Association bulletin *Tube Collector*. Lud has received our Houck Documentation Award (1999) and Tyne Tube Award (1998). I understand that his first column, in our August issue, will contain a retrospective of Brother Pat's many contributions to the preservation of vacuum tubes and vacuum tube history. We'll all be looking forward to it!

It is perhaps appropriate that this issue has a decided vacuum tube slant. Australian tube collector and historian Fin Stewart provides some insights into early tube manufacture in his country and Koji Watanabe shares with us his replication of one the first broadcast superhets to be manufactured in Japan after World War II. You'll also find Hank Olson's review of the evolution of AC-DC radios.

Turning our attention to the remainder of the issue, Ken Owens' restoration column had to be omitted again because of lack of reader input. But, once more, Ken has contributed a feature article in its stead. If you have a problem with a burned-out early AK AC power pack, his sure hand will guide you through a surprisingly painless rebuild. But please be sure to review Frank Lotito's "Letters to the Editor" contribution suggesting an idea for getting Ken the participation he needs to continue his column.

Professor H. Richard Crane describes some practical experiments with Coherer technology; President Bill Fizette contributes a second installment of his restoration-advice-for-beginners series; William Coffey shares memories of an interesting spur-of-the-moment visit to a Voice of America transmitting site; and Art Bilski, Public Relations Director for Antique Radio Club of Illinois, contributes a moving farewell to radio collector *extraordinaire* Doctor Ralph Muchow, who became a silent key last March.

Finally, you'll find the usual May issue preview of our exciting Rochester conference. Make your reservations now and get started on those contest entries!

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ing parts for robust cleaning, I have found that Zippo lighter fluid does a great job. (No doubt you must use it outside, and you must make sure the set fully airs out before bringing it indoors.)

I'm sure there are one or more members out there with field maintenance experience on multi-contact/multi-position switches on sophisticated test and communications equipment. Maybe one of these people could enlighten us with some good techniques. When I say clean a switch, I mean a typically open contact switch which is gunked up with 40 to 70 years of dust, dirt, soot, and possibly corrosion due to acid gas exposure such as you would experience in an industrialized city environment, and a heavy coating of regular old fashioned black copper or silver oxide!

I'd love to be able to share my own techniques in an article if I were confident about them. And I'd certainly appreciate hearing from an expert with a good appreciation of chemistry and/or metallurgy who is in a position to adjust the cleaning method to the type and degree of contamination.

Topic 2. How do you repair a *broken* band or function switch? I've seen, and at times even caused, the following types of breaks: *a.* cracked ceramic or phenolic substrate *b.* stator switch contact broken or hopelessly smashed *c.* snapped detent spring *d.* worn interface between drive shaft and rotor causing the contacts to lose registration on one of more wafers. Needless to say, despite the plethora of band and function switches in the world, there were never common over-the-counter repair parts. Most of these switches were custom jobs manufactured by a switch specialty company. As for a new replacement switch, forget it! Most of the companies that used these switches, i.e., Hammarlund, Hallicrafters, Heathkit, National, Knightkit, RME, etc. are long out of business.

Here we need a pretty clever person with lots of ingenuity and switch repair experience. Maybe even a collection of "how I did it mini-articles" from different individuals. There are probably many ways to repair a busted switch, and make the

finished job work reliably and look like it belongs. A few examples, including alternate approaches for each type of damage, would be great!

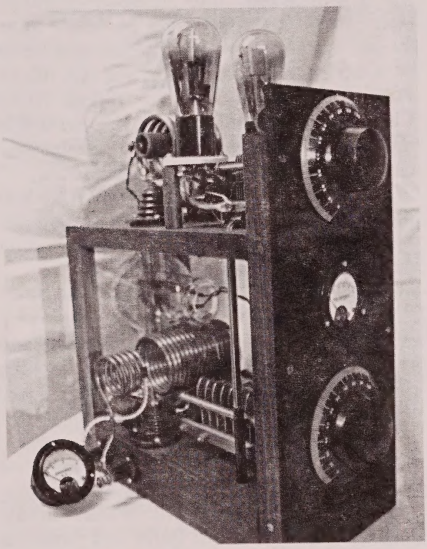
FRANK LOTITO
Pittsburgh, PA

What about it, group? Will some of you rise to Frank's challenge and share your restoration lore (switch repair or otherwise) with Ken Owens, our "Equipment Restoration" editor? Ken's column is also absent from this issue because of insufficient reader input. Send your contributions to Ken at 478 Sycamore Dr., Circleville, OH 43113. MFE

WILL THE REAL MATLACK WINNER PLEASE STAND UP!

I would like to thank the equipment contest committee of the 1999 annual conference for awarding my transmitter project the Matlack prize.

However, the transmitter pictured in the November *OTB* (p. 27) is not mine, although the caption is correct. It is actually Rick Weber's Hartley transmitter. Rick's rig took second place in Category 21 (New and Rebuilt), while my 1931 *QST* MOPA took second place in category 18 (Tube Transmitters).



Stan Hojnacki's 1931 QST *MOPA rig and Matlack prize winner.*

I'm attaching a picture of my own rig, and hope to enter another project in the 2000 contest.

STAN HOJNACKI
Blackwood, NJ

NAZI RADIO REGULATION TACTICS?

I enjoyed reading the *Mikes and Men* column entitled "Traitor!" in the February 2000 *OTB*. The author states that "it's hard to believe you'd be severely punished for listening to the radio," referring to the warnings contained in a 1944 Nazi Germany poster. What is even harder to believe is that this is also true in the United States today.

Ever since the early days of radio, the U.S. government has regulated the *transmission* of radio signals, but until a few years ago there was no attempt to regulate radio reception in this country. That was changed with the enactment of the Electronic Communications Privacy Act that now prohibits individuals from monitoring signals such as cellular telephone conversations, even when using one's own receiver in the privacy of one's own home. Later, the prohibition was extended to include unlicensed Part 15 devices like cordless telephones. Listening in on certain other communications, including remote pickup broadcast signals is also forbidden. It is presently illegal to sell receivers even capable of picking up certain portions of the 800 mhz band. Severe penalties are prescribed for violations of this law.

The government has declared it illegal to monitor any part of the radio spectrum not specifically permitted by this law. One more freedom we have always taken for granted is now gone.

DONALD CHESTER, K4KYV
Woodlawn, TN

IOWA HAMS TAKE NOTICE

After I began a collection of 1920s and 1930s amateur QSL cards from my native Iowa, I noticed that several of them suggested close ties to early broadcasting. This led me to renew a search for Iowa broadcast history begun in the early 1990s. Eventually, I had to conclude that there simply was no definitive written history of broadcasting in Iowa. Not even the Iowa Broadcasters Association has a historical archive.

Later I learned that Grant Price, a highly respected, Iowa newscaster, had begun work on such a project after his 1990 retirement. Grant is Vice President Emeritus of Waverly, Iowa's Wartburg College. That fine school has granted physical space and financial assistance. The IBA has also contributed financial support.

Grant has not had better luck in finding a significant history collection. As a first order of business, he has completed more than 70 taped interviews with persons having first hand knowledge of the subject. The urgency to complete these taped interviews is obvious.

While interviewing, Price also became keenly aware of the role that amateur radio had played in the development of Iowa broadcasting. I'm now assisting him in gathering suitable documentation from the amateur community. If any *OTB* readers have first hand knowledge or materials relating to amateur or commercial broadcasting in Iowa prior to World War II, you can be of great help to this long neglected project.

I can absolutely assure you that all materials, including those I have personally collected, will be turned over to Wartburg College for preservation; none will be sold nor traded.

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e-mail: w5usm@aol.com

THANKS FOR THE ARTIE SHAW RECORDINGS!

I'd like to thank the member who presented me with a cassette of some of my favorite Artie Shaw recordings at the Rochester meet last September. It happened so fast that I didn't have a chance to write down your name. I've enjoyed the recordings a lot and will thank you more personally if you'll identify yourself.

ALAN CARTER
35 Blenheim Park Rd.
South Croydon, Surrey
England CR2 6BE

TESLA REBUTTAL

The following is in reply to the letters about Tesla in the November issue. Gary Gordon compared the 1mW output of a crystal set to the Tesla's transmission of power. The voltage on the antennae of an AM transmitter may be a few thousand volts, Tesla was using 2 million volts. At very high voltages some different things seem to happen.

Henry Bradford mentioned using only "reliable sources" for his article. Concerning a new technology who is a reliable source? In retrospect there seem to be very few of them.

Hertz told Marconi that he was wasting his time experimenting with radio. Prof. H. Morton in 1879 claimed that Edison's light bulb was "A fraud upon the public." In 1903 Simon Newcomb, Professor of Mathematics and Astronomy at Johns Hopkins, said that powered heavier than air flight was "utterly impossible." In 1906 the editor of *Scientific American* stated that the reports concerning two bicycle mechanics flying around at Kitty Hawk and Dayton were just a hoax.

This list could go on and on, and a lot of discoveries and inventions have been lost to us through disbelief. The Wright brothers probably only made it into the history books because President Teddy Roosevelt ordered public trials in 1908.

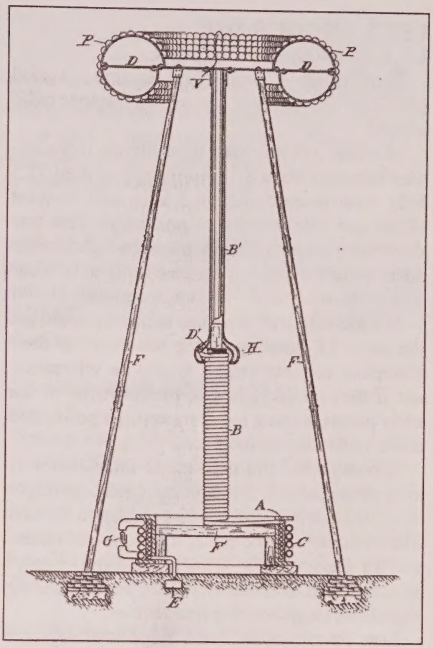


Illustration of transmission terminal from Tesla patent No. 1,119,732. (Courtesy Mike Twose)

Mr. Bradford apparently does not consider Tesla himself to be a reliable source. Tesla's patents (645,576 and 649,621 filed in 1897 and 1,119,732 in 1902), state that he was talking about transmitting industrial amounts of power. Perhaps Tesla is still considered to be unreliable for claiming that his alternating current power system would be better than Edison's DC.

Actually Tesla was probably not really transmitting power as much as converting or transforming the power of the ether into a more easily received form. Now, a century later, recent theories indicate that space is filled with an almost unlimited amount of energy. From the work of Tesla, and other inventors such as Townsend Brown, it appears that one way to tap into this free energy is to use very high voltage DC impulses.

Readers of the *OTB* might find this forgotten technology interesting. Some books about it are: *Tapping the Zero-Point Energy* by Mory B. King and *Secrets of Cold War Technology* and *Lost Science*, both by Gerry Vassilatos.

MIKE TWOSE
Toronto, Ont., Canada

LET'S ENCOURAGE LF EXPERIMENTATION

Frank Lotito's "Below 535" column is a good idea. Low frequency is where long distance radio started.

Marconi's first regular transatlantic radio service between Nova Scotia and Ireland used 37.5 kHz west-to-east and 54.5 kHz east-to-west (8000 and 5500 metres, respectively). This was done with a few hundred kilowatts input to the spark transmitters, but no electronic amplification in the receivers—just large aerials.

If American and Canadian amateurs could get the same LF band operating privileges as their European counterparts, it would be interesting see if they could follow in the footsteps of the early pioneers using lower transmitter power and more sophisticated receivers,

Atmospheric and man-made interference is very strong at low frequencies. Listeners might want to experiment with noise reduction circuits like Marconi's spike-reducing "balanced detector" or Fessenden's "interference preventer," which tended to cancel out static and interfering signals on neighbouring frequencies.

Low frequency listeners may not always get strange buzzes and beeps. Occasionally they may be rewarded with signals from broadcasting stations across the Atlantic in the 148.5 to 255 kHz band. Some of these stations are rated at several hundred kilowatts. On one evening in the 1970's I picked up seventeen of these stations. I suspect it was freak reception, but I do not know because I haven't been tuning in to the low frequency band regularly.

HENRY M. BRADFORD
Wolfville, N.S., Canada

BELATED CORRECTION

I am not surprised that, in the rush to meet the publication deadline, you overlooked a correction I sent you for my article in the February issue ("Evolution of a 1922 MOPA Transmitter"). After the last sentence in the first paragraph on p. 44 (...and the RCA rheostat for the 204.), the following sentence should be inserted: "The two rheostats were later additions, and although contributing to the authentic appearance, as connected would tend to unbalance the AC in the filament circuit. In operation, the filament voltages are really set by variacs in the AC input line.

ROBERT GUNSHOR
Sandwich, MA

THE VINTAGE RADIO PROJECT

The Vintage Radio Project was initiated in 1993 when Bob Brunet of New York City wrote a letter to East Stroudsburg University's then-president Gilbert asking if ESU was interested in receiving a donation of 3,000 hours of vintage radio programming on reel-to-reel tapes. Mr. Brunet had personally taped the programming over the course of 40 years.

He selected ESU for his donation simply by seeing the university name on an expressway exit sign as he drove past it. President Gilbert contacted Joe Ashcroft, then Chair of the Department of Communication Studies, and Professor Ashcroft contacted me. He and I then met with Mr. Brunet and decided to accept the collection on behalf of the Department of Communication Studies.

This led to the establishment of the Vintage Radio Project, of which I was appointed Director. The project has two main goals: (1) to preserve the vintage radio programs, and (2) to make the programs available to the public. To that end, I decided to put together the technology to transfer the vintage radio programs from rapidly deteriorating reel-to-reel tapes to Sony minidiscs. By digitizing the program we would also be in a position to improve their fidelity.

After several years of indexing the collection and digitizing enough programs (some 100 hours) to make a broad sample available to the public, we began broadcasting *The Vintage Radio Hour* in the Summer of 1999. Currently, *The Vintage Radio Hour* can be heard from 4-5pm on Tuesdays, Thursdays and Fridays on WESS radio (90.3 FM).

So far, I have raised over $4,000 in funding to facilitate the work of the Vintage Radio Project. The funding has made possible the purchase of essential equipment, and the benefits of the Vintage Radio Project should be many. Listeners will appreciate hearing educational and theatrical radio from the past 50 years that cannot be found on commercial radio stations. Professors and students should find many opportunities for research in both the programs themselves and the original advertisements they contain.

The Vintage Radio Project at East Stroudsburg University is entirely dependent on donations and grants to move forward. Money is used to purchase equipment and supplies, to maintain the equipment, and to investigate new approaches for making the collection more accessible. Monetary donations of any amount are much appreciated and should be mailed to Vintage Radio Project Archivist, WESS Radio, McGarry Building, East Stroudsburg, PA, USA 18301. Phone 570-422-3615

ROB MCKENZIE, Ph.D.
Associate Professor of Communication Studies
East Stroudsburg University

AWA NEWS

OTB **POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

May 6
Bloomfield NY
Spring Meet

May 6
Semi-Annual Board
Meeting (following
Spring Meet Auction)

May 13
CC-AWA Spring
Mini Meet

May 19-20
Radio Daze 2000

June 9-10
IHRS/AWA Spring Meet

July 22
CC-AWA Summer
Mini Meet

November 5
Membership Meeting
followed by Semi-
Annual Board Meeting

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

BLOOMFIELD, NY SPRING MEET

May 6

There'll be plenty of great finds to be made at our low-key, but always rewarding spring meet.
8:00 a.m.—Flea market officially starts. Parking spots are $2.00 (set up 6 a.m.). No attendance charge.
9:00 a.m.—Sale of excess items from the museum annex.
Noon—Famous sit-down luncheon served by the American Legion Ladies. Tickets available on site Saturday morning.
1:00 p.m.—Members' auction (no fee) and auction of goodies from the Annex.
2:00 p.m.—Museum open to visitors.
Location: AWA annex building, 6910 Rt. 5 & 20 (near intersection with Rt. 444), Bloomfield, NY—on the grounds of the American Legion post. For further info, contact Ed Gable at (716) 392-3088 or k2mp@eznet.net

2ND ANNUAL KUTZTOWN MEET

May 13

A SPECIAL INVITATION FOR ALL FORMER SCHOOLEY'S MOUNTAIN ATTENDEES. At the Renningers Antique and Farmers Market, Kutztown, PA. 75+ spaces under roof plus unlimited spaces outdoors. $15.00/space, walk-ins free. We are going to try to include an auction this year. Camping available on site and motels nearby. For more info: Dan DeWald (610) 683-6848; Steve Wallace: (610) 944-7230, kks@epix.net.

CC-AWA MINI-MEET

May 13

"Spring Swap Meet" presented by the AWA Carolinas Chapter at the North Carolina Transportation Museum "Spencer Shops," located in Spencer NC. FREE admission. Info: contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

RADIO DAZE 2000

May 19-20

Presented by the Northland Antique Radio Club and the Pavek Museum at Comfort Inn, Hwy 55 and Interstate 494, Plymouth, MN 55447, (612) 559-1222. Swap meet dawn til dusk Friday, dawn till noon Saturday. Auction Friday evening, contest, luncheon and program on Saturday. Radio raffle, Hospitality room open 7 a.m. both days. For additional info, contact NARC at P.O. Box 18362, Minneapolis, MN 55418 or visit the NARC web site at http://www.geocities.com/TelevisionCity/4544

IHRS/AWA 29TH REGIONAL SPRING MEET

June 9-10

At the signature Inn East in Indianapolis. Swap meet Friday, auction Saturday. Friday evening banquet features the Charleston Chasers, a New Orleans style jazz band. For more info call Bob O'Friel at 317-849-4028 or Dr. Michael Clark at 317-738-4649

WIRELESS MUSEUM GARDEN PARTY

June 10

Gerry Wells, Curator of the Vintage Wireless Museum, hosts his annual garden party at the museum, 23 Rosendale Rd., West Dulwich, London SE21 8DS. The party is open to all interested antique radio enthusiasts. Telephone 0181 670 3667.

HARPENDEN SWAPMEET
June 11
40 miles outside London, England. For more info, contact Terry Martini, British Vintage Wireless Society. Snail mail 122b Cannon St. Rd., London, England E1 2LH; Telephone 0171 702 8774; email terrym@globalnet.co.uk

RADIOACTIVITY 2000
June 15-17
The Mid-Atlantic Antique Radio Club is proud to announce our annual megameet. By popular demand, the flea market will be open earlier this year, at 1:00 p.m. on Thursday. Old equipment contest, seminars, big Saturday auction. Special estate auction Friday evening, sponsored by The Radio History Society, liquidating the very large radio collection of the late Len Noles, Preregistration (must be mailed before June 3) $4; $8 at door (spouses and children free); flea market spaces, $10. Location same as last year, though hotel now called the Sheraton College Park. A block of rooms is available at $82.00 single or double (group MEK, cutoff date May 15, (301) 937-4422). I-95 exit 29B southwest corner of interchange. To preregister or for more info contact Brian Belanger, 5730 Avery Park Dr., Rockville, MD 20855-1738, (301) 258-0708 or visit www.maarc.org

CC-AWA MINI-MEET AWA
July 22
"Summer Swap Meet" presented by the AWA Carolinas Chapter at the NC State fairgrounds in Raleigh NC. FREE admission. All indoors and air-conditioned. Info: contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

JAMES MILLEN SOCIETY FORMED

This organization of collectors and historical enthusiasts focuses on the use, restoration and preservation of radio communications equipment exhibiting design or construction influences attributable to Mr. James Millen. Membership is open to all recognized Millen enthusiasts through sponsored nomination. Further information can be obtained from the society's website at http://www. qsl.net/jms or mail to Donald A. Buska, 4805 64th Ave., Kenosha, WI 53144 (Business Size SASE Required).

ARCI RADIOFEST XVIII
August 4-6
Presented by Antique Radio Club of Illinois at the Ramada Hotel, Elgin, IL. Huge flea market, old equipment contest, auctions, awards banquet & show, presentations, Motorola display. For more info contact ARCI, P.O. Box 1139, La-Grange Park, IL 60526 or E-mail us at: arci31280@aol.com

IHRS ELKHART MEET
August 19
At the Hi-Dive Park Pavilion, 500 E. Beardsley. Swap meet, silent auction, carry-in dinner. For more info, contact Terry Garl at 219-679-4280.

AWA MEMBERSHIP AND BOARD MEETING AWA
November 5
At Rochester Thruway Marriott. Take Thruway (I-90) Exit 46, then I-390 North to NY 253 West to NY 15 South. Membership meeting at 1 p.m. (open to any interested member) followed by Semiannual Board Meeting.

Recurring Meetings

• **California Historical Radio Society**—For info on current meetings, call the CHRS hotline: (415) 821-9800.

• **CARS**, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cinti.) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

• **Carolinas Chapter of the AWA**—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

• **Central Ohio Antique Radio Assn.**—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

• **Delaware Valley Historic Radio Club**—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The*

With the Chapters

There's really been a lot going on in the CC-AWA. The Executive Committee met on Sunday February 27th at the historic WBT transmitter site. We were hosted by Executive Committee member Ted Bryan, who is Chief Engineer at WBT. This was the second time we met here, the first time the weather was really poor and the tour was limited to the inside of the transmitter building. This time we got the grand tour including one of the three main towers and tuner house. We also examined the remaining bases for the two original towers that were installed in 1927.

Some of the items discussed after the tour were the pending "official" AWA chapter status, our own incorporation that had just been filed and made official with the state of North Carolina on Feb. 15th, and our acquisition of a commercial liability insurance policy (the latter items being required by the AWA to qualify for "Official" chapter status in their newly updated by-laws.) Also were the final plans for our 24th "Spring Meet in the Carolinas" (held on March 23-25), the long range plans for our own museum, and the preservation of WBT archives that could be endangered when Ted Bryan retires in the next year or two. Ted loaned us a nice stack of original photos and spec sheets from the 20s so they could be scanned and saved on CD-ROM. Robert Lozier volunteered to undertake the project. It is hoped that we will be able to convince the corporate owners of WBT to donate the contents of the WBT archives to our club so they can be preserved and hopefully displayed in our future museum.

The Annual Spring Meet in the Carolinas was another tremendous success, the "Radio Meet Gods" once more granted us fantastic weather with clear "Carolina Blue" sky and temps in the mid 70s. Pre-Registration was up a good bit over last year. Watch for a detailed meet report by AWA board member Larry Babcock in a future *OTB* issue (maybe August).

See the "Calendar of Meets" section for our upcoming spring and summer mini-meets (May 13 and July 22). Also watch for a NEW CC-AWA web page that may be up and running by the time you read this. It will be located, as before, at CC-AWA.org. You can also get there via a link from the Antique Wireless Association web page at www.antiquewireless.org. Among other interesting stuff you will find full details there about ALL upcoming Chapter activities and lots of photos of chapter events and of members collections.

Oscillator. For more info contact Bill Overbeck at (610) 789-8199 or Dave Snellman at (215) 345-4248. Club mailing address: P.O. Box 847, Havertown, PA 19053.

• **Houston Vintage Radio Association**—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership $15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

• **Hudson Valley Antique Radio & Phono Society**—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

• **London Vintage Radio Club**—This Ontario, Canada club meets in London on the last Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada. (519) 638-2827.

• **Mid-Atlantic Radio Club**—Meets monthly, usually the third Sunday of the month at the New Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Ed Lyon, 11301 Woodland Way, Myersville, MD 21773-9133, (301) 293-1773, e-mail lyon@fred.net or Membership Chair, Paul Farmer, (703) 960-0650, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

• **New Jersey Antique Radio Club**—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

• **Northwest Vintage Radio Society**—Meets second Saturday of each month (except July and

AWA NETS

PHONE:

SUNDAY:
7244 kHz, SSB, noon (NCS:WA4IAM);
3837 kHz, AM 4 p.m. (E.S.T.), 4:30 p.m. (during E.D.S.T.) (NCSs:W2ZM & W2AN)

TUESDAY:
14274 kHz SSB, 2:30 p.m. (NCSs KC3YE and WOFXY)
3837 kHz SSB, 8 p.m. (NCS N4FS)

MONDAY-WEDNESDAY-FRIDAY:
3867 kHz, 9:30 a.m. (NCS: W2SHN)

CW:

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up. First **WEDNESDAY** of each month, 8 p.m., 7050 kHz

2-M REPEATER (Rochester Area)

MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 146.8 MHz
Transmit 146.220 MHz

August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

• **Oklahoma Vintage Radio Collectors**—Meets second Saturday each month, Oklahoma Station Bar-B-Q, 4333 NW 50th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625, or call (405) 755-4139 or (405) 732-6070.

• **Ottawa Vintage Radio Club**—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: $10 Canadian/yr.

• **Society for Preservation of Antique Radio Knowledge**—Meets at 7:30 p.m., fourth Tuesday of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $12/year. Write SPARK, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call Dan Gebhart (937) 299-9570.

• **Texas Antique Radio Club**—Meets alternate months in Kyle and Shertz, TX. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Richard Ransley, P.O. Box 41, Sodus, NY 14551. The following are available:

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WW I military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921

Nominations for AWA Awards

It is time to nominate candidates for six prizes to be given at the annual conference.

The **AWA Houck Award for Documentation** goes to an AWA member who has written several original articles on radio development or history in *The OTB, Review*, or other publication. (This can include a book on a related subject.)

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired and preserved by documenting an outstanding collection of radio artifacts. Send your selection(s) to the Houck Awards Administrator, giving your reasons why the nominee(s) should receive the Award. The address: Barney Wooters, 8303 E. Mansfield Ave., Denver, CO 80237.

The Bruce Kelley-OTB Award is given to the member who publishes in the *OTB* an article judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in the August and November 1998 and February and May 1999 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and the *OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Bill Denk, W3IGU, 81 Steeplechase Rd., Devon, PA 19333.

The J. Albert Moore award is a newly-instituted companion to the Bruce Kelley-*OTB* Award. The award comes to us through The Antique Radio Club of America, which was merged into AWA a few years ago. It was originally given for the most outstanding article (any category) contributed to the ARCA Gazette during the publication year. Though the award continues a memorial to Mr. Moore's contributions to ARCA, it has been re-oriented as a companion to the Bruce Kelley-*OTB* Award—honoring articles that do not fall into the historical category considered for the latter. And so the Moore award will be given "... to the article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed in the *OTB* during the award year. Eligible articles include those dealing with troubleshooting, restoration, performance evaluation, identification methods, and history." For this year, articles in the August and November 1998 and February and May 1999 issues will be considered. All AWA members are eligible for this award except those on the Award Committee and the *OTB* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Thomas F. Peterson, Jr., 3060 Lander Rd., Cleveland, OH 44124.

The **Taylor Award**, in memory of John Taylor, RCA TV Developer, is for "preserving television history." Submissions are invited here, too, to Peter Yanczer, 835 Bricken Pl., Warson Woods, MO 63122.

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations may be sent, with supporting reasons, to administrator Lauren Peckham, Box E, Breesport, NY 14816.

Please send nominations for all awards by August 1, 2000

transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and 1BCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

Past AWA Award Winners

	HOUCK DOCUMENTATION	HOUCK PRESERVATION	BRUCE KELLEY-OTB	J. ALBERT MOORE	TAYLOR	TYNE TUBE
1971	Thorn Mayes					
1972	Bruce Kelley	Ed Raser				
1973	Gerald Tyne	Robert Merriam				
1974	Lou Moreau	Warren Green				
1975	William Breniman	Stuart Davis				
1976	Howard Schrader	Wayne Nelson				
1977	Ralph Williams	Vance Phillips				
1978	Don deNeuf	Lauren Peckham				
1979	Ivan Coggeshall	Joseph Paveck				
1980	Lloyd Espenschied	Ralph Muchow				Bro. Pat Dowd
1981	Alan Douglas	John Caperton				John Stokes
1982	———	Fred Hammond				Lauren Peckham
1983	Kaye Weedon	Bro. Pat Dowd				William Condon
1984	Floyd Paul	Rex Matlack				———
1985	Hugh Aitken	Ralph Williams			Ken McIntosh	———
1986	Bill Fizette	———			Richard Brewster	Alan Douglas
1987	John Nagle	———			Edmund Taylor	Rüdiger Walz
1988	Don Patterson	Robert Lozier			Stephen Hofer	Bill Orr
1989	Bob Morris	Bruce Kelley			Peter Yanczer	———
1990	Morgan McMahon	Charles Dachis	Jack Kingman		Arnold Chase	Gertrude Tyne
1991	John Anderson	Bob Paquette	Lloyd Espenschied		Pat Leggatt	John Anderson
1992	Tom Lewis	Al Jones	Robert Murray		David Johnson	———
1993	Bill Holley	Mike Feher	Peter Yanczer		———	Edward Herold
1994	Edwin Lyon	———	John Okolowicz		John Okolowicz	Albert Jones
1995	Mike Adams	Perham Museum	Dr. Rob't Murray		Morgan Wesson	———
1996	William Orr	Jerry Vanicek	George Michael		Albert Abramson	Peter A. Keller
1997		———	James Rybak		———	———
1998	John H. Bryant & Harold Cones	Museum of His-Tory & Technology	Joel P. Ross		Malcolm Baird	Ludwell Sibley
1999	Ludwell Sibley	James & Felicia Kreuzer	Bro. Pat Dowd	Richard A. Parks	———	Eric Barbour

AWA Review Volume 12 Now Available

The Atwater Kent Radios

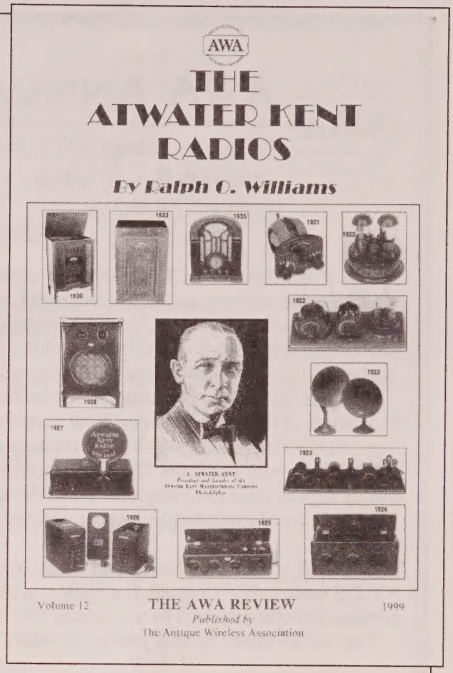
By Ralph O. Williams

One of the giants of American industry, by any standard, was Arthur Atwater Kent, who, in the brief span of fourteen years, designed, manufactured, marketed and sold some five million radios. While Kent became exceedingly wealthy in the process, he in turn bequeathed to us a legacy of a myriad of unique, high quality products. These products of his energy and invention are the topic of *The AWA Review*, Volume 12.

The author, Ralph Williams of Orient, NY, has spent a large part of his adult life studying Atwater Kent, his methods, and his radios, and is widely recognized as the world expert on the subject. Since his retirement, he has founded a private museum, one of the most complete in the world, devoted to the man and his radios. The results of this dedication have also appeared through the years in various writings, including a series in *The AWA Review*, Volumes 1, 2, 3, and 10 in 1996. Other journals, such as *Radio Age*, have also published his material, which has proven to be very popular. Unfortunately, with the possible exception of the 1996 material, these publications are all now out of print and must be obtained through private sources.

The sheer quantity of material in Volume 12 of *The AWA Review* has necessitated a much larger publication than usual. To assemble the details and present them in a coherent and progressive manner has been a monumental job on the part of the author, and the book has been several years in preparation.

This book is *not* simply a reprint of prior writings, but is a complete new work, covering the entire range from the first of the radio laboratory instruments to the later superhets. Details not previously printed are included. The book boasts over 100 pictures. Our author has also commented on the changing face of the radio art and the socioeconomic climate of the 1920s and 1930s, which provided the challenges so important to the success of Atwater Kent. This background of the era is valuable to any student of the time and collector of the artifacts, and is not necessarily limited to those interested in Atwater Kent. There are three appendices, including a section on refinishing and restoring breadboards, an index of all models, and a separate insert detailing the radios and their characteristics.



The beginning collector will find here a wealth of subject material to work with. The more experienced collector will find information that can help clear the confusion regarding details of the various sets as they were developed. This book is also presented to help focus attention on this remarkable man and his contributions, and perhaps stimulate all collectors to new efforts.

The AWA Review, Volume 12, 1999. "The Atwater Kent Radios," by Ralph O. Williams. Size: 6 by 9 inches; 320 pages, soft cover; illustrated. Price: $29.95 postpaid in the US and Canada; $35.00 US funds elsewhere. Order from Edward M. Gable, 187 Lighthouse Road, Hilton, NY, 14468.

AWA ANNUAL CONFERENCE

THRUWAY MARRIOTT, ROCHESTER, NY
SEPTEMBER 6-9, 2000
THEME: CROSLEY

WELCOME BACK! At the 39th annual conference, collectors and history enthusiasts will convene, exchange equipment, and learn more about the development of radio and electronics. If you have never been to the yearly "reunion," why not give it a try? Rochester (Henrietta) is just north of upstate New York's beautiful Finger Lakes region, easily reached by car or plane. The site is 26 easy miles from the AWA Museum at Bloomfield.

Advance registration is encouraged to facilitate preassembly of registration materials and pre-assignment of flea market spaces. Your materials for advance registration will be included in the August *OTB*. There will be unlimited registration at the door.

The conference site is the Thruway Marriott, which is a full-sized, full-service hotel. It offers special nightly rates ($92 single, $95 double) up to Aug. 14. For info or reservations, call (716) 359-1800. the Marriott has high-quality restaurant facilities, and other lodging and eating places are nearby.

The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles or 15 minutes from the airport. There is shuttle service, 7 a.m.-11 p.m. (specify the Thruway Marriott).

The special theme for this year is "Crosley."

Conference Chairperson
BRUCE ROLOSON

Program Chairperson
LAUREN PECKHAM

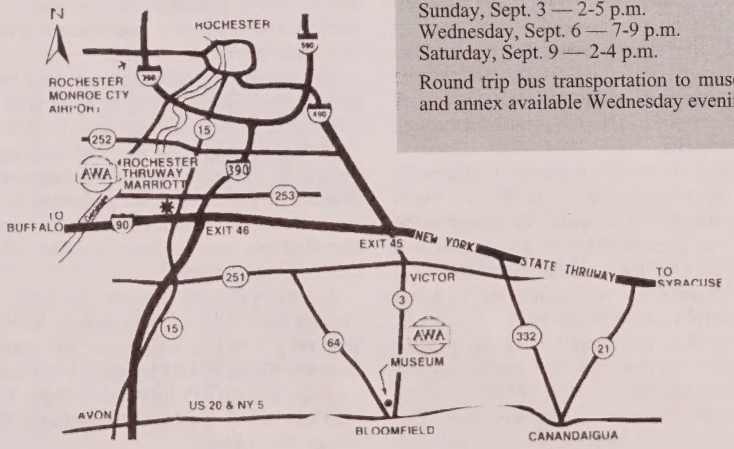
Contest Chairperson
GEOFFREY BOURNE

AWA ELECTRONIC COMMUNICATIONS MUSEUM
VILLAGE GREEN, BLOOMFIELD, NY

Refer to map at left. Directions from hotel: Right (south) on Rt. 15. At Avon (9.5 mi.), left (east) on RTS. 5 & 20. At Bloomfield (16 mi.), left at brown "Radio Museum" sign near Holloway House restaurant. Go approx. 200 ft. and park. Museum is on the left.

HOURS:
Sunday, Sept. 3 — 2-5 p.m.
Wednesday, Sept. 6 — 7-9 p.m.
Saturday, Sept. 9 — 2-4 p.m.

Round trip bus transportation to museum and annex available Wednesday evening.



THEME: CROSLEY

Programs

ANNUAL HISTORICAL BANQUET AND AWARDS
Program to be announced

THOSE FEW COMPANIES STILL MANUFACTURING VACUUM TUBES
Presenters: Lud Sibley and members of The Tube Collector's Association

HALLICRAFTERS—A HISTORY OF THE COMPANY AND THE ASCENT OF THE BC-610
Presenter: Robert Grinder, K7AK

CROSLEY AND SUPER POWER STATION WLW
Presenter: Charles Stinger

BEGINNER'S PROGRAM: EVOLUTION OF THE BROADCAST RECEIVER
Presenter: Marc Ellis
(After the talk, those interested will be invited to meet with Marc Ellis and President Bill Fizette for an informal discussion of basic radio restoration issues.)

KEY AND TELEGRAPH SEMINAR
Moderated by Tom Perera and a panel of experts.

THE MUSEUM OF RADIO AND TECHNOLOGY—AN OVERVIEW
Presenter: Lloyd McIntyre

THE 32-VOLT DC FARM LIGHTING SYSTEM
Presenter: Dale Goodwin

NEWS FOR THE SHORT WAVE LISTENER
Presenter: Bart Lee

PRE-1912 WIRELESS AND ELECTRICAL APPARATUS DISPLAY AND DISCUSSION
Moderated by Lauren Peckham

REVIEW OF AMATEUR OPERATION
Discussion leaders: Mike Raide, W2ZE and Bob Raide, W2ZM

Many other activities are in store for you, including the huge flea market, three separate auctions, trips to the AWA Museum and Museum Annex, the old equipment contest, ladies' lunch, and our ever-popular book fair.

SEE P. 18 FOR OLD EQUIPMENT CONTEST CATEGORIES

BY GEOFFREY BOURNE AND RALPH WILLIAMS
CONTEST COORDINATORS

THE OLD EQUIPMENT CONTEST

2000 AWA CONFERENCE

— Reviewing the Crosley Corporation —

The AWA Old Equipment Categories for the 2000 contest are divided into two major groups; Theme and Standard. The Theme categories reflect the central historical purpose of this year's conference: a review of products and history of the Crosley Corporation. The Standard Categories: Receiver, Transmitter, Craftsman, and Tubes, encourage competition in more general areas of our hobby. These remain essentially unchanged from year to year.

This year, however, we *will* be making some changes in the Standard categories. You'll notice that receiver categories are now generally based on type of circuitry rather than number of tubes. The other categories remain unchanged.

As before we offer two transmitter categories; Spark and CW. And the Craftsman categories continue to fulfill a strong membership interest by offering opportunities to showcase conservation and restoration skills. The tubes category, newly introduced last year, provides an outlet for members interested in the history and operation of vacuum tubes from all eras.

THE THEME CATEGORIES

1. The 1920s

In the early 1920s Crosley made a wide variety of battery sets. These included sets in the ACE and Harko series as well as those carrying the Crosley brand. This is the category where you would enter a model 51, 52, PUP, Trirdyne, V, VI, etc.

2. The Metal Box Sets

During the 1920s many radio manufacturers introduced metal cabinets. Crosley made some fine examples, so bring in your Show Box, Band Box or any other Crosley metal set.

3. Cathedrals and Tombstones— The 1930s

In the 1930s the country was in the middle of The Great Depression. Money was tight and radio was becoming very popular; to maintain its share of the market, Crosley brought out a line of low cost receivers. A good example of this was the Cathedral radio. This would be the category to display a model 124 or a nice tombstone. Another example would be one of the interesting floor models, such as the Playtime Grandfather Clock Radio.

4. The Crosley Fiver and Super Eight

Crosley produced a wide variety of inexpensive receivers. The "fiver" was one of their most popular sets. This would be the category to enter this type of set.

5. Crosley Speakers

Over the years, Crosley produced many speakers. This would be the category for a Musicone or a Dynacone unit.

6. Television 1940-1960

When television came on to the market just about every manufacturer made a set. Crosley made a wide variety of sets from table tops to floor models. Bring in a fine example to share with everyone.

7. Company History

In this category we are looking for company information, sales quotes, engineering documents, technical information bulletins or other documents to add life to the company.

8. Advertising and Customer Documents

Enter your customer-oriented documentary artifacts: Magazine ads, dealer displays, giveaways, descriptions of radio or television programs, and customer instruction books are all examples of possibilities for this category.

9. Other Crosley Products.

Like other major corporations of its type, Crosley made many other products. These varied

from refrigerators to cars. Surprise us! (Contest note: Cars will be displayed in the parking lot just outside of the contest room.)

THE STANDARD RECEIVER CATEGORIES

10. Passive Receivers

Any detecting device, not including vacuum tubes or solid state amplifying devices, whose purpose is to convert radio energy into intelligent signals.

11. 1920s Superhet Receivers.

Any 1920s receiver employing the superheterodyne circuit can be entered here.

12. 1920s Tuned RF Receivers

During the 1920s the TRF set was one of the most widely produced sets on the market. It was sold in kit form or factory assembled. Many built theirs from scratch using plans published in magazines. This is where you would enter receivers such as a Freshman Masterpiece or an AK 20.

13. 1920s Regenerative and Reflex Receivers

Manufacturers tried a variety of other circuits to improve the receiving capabilities of their radios—the regen and reflex among them. Bring in a fine example of a radio using one of these circuits.

14. Cathedrals and Tombstones

These are probably the most recognized vintage cabinet styles today. Just about everyone remembers such a set that was once in their home, a friend's or a relative's. So bring in that Philco 90 or Zenette or any other cathedral or tombstone style radio.

15. Novelty Radios

Entries here can range from a teddy bear transistor set to a lamp radio. There are many different styles and variations. Some fine examples would be an Empress Chalet radio, Melody Cruiser ship radio. Bring in any radio made to look like something else.

16. Speakers

A. HORN. Any sound reproduction device can be entered here as long as it employs a horn or bell for sound amplification.

B. CONE. When radio sets obtained greater power output levels, the magnetic speaker unit

JUDGING THE OLD EQUIPMENT CONTEST

Every year, people ask how we judge the old equipment contest. Here are the criteria that have been established.

1. Historical Significance

Contribution to the art; contribution to social history; possession by a radio "famous owner," special circumstances in contestant's family history; contribution to the study of communication.

2. Uniqueness and Rarity

Few of a kind vs. production run (uniqueness); number originally produced (commonness); number surviving (rarity); original use and value (Does the entry amplify, illustrate or illuminate a phase of radio not commonly known? Does it stand out from the rest of the entries?).

3. Quality of Restoration

Cleanliness: internal and external; craftsmanship of repair, mechanical and electrical; conformance to original design (factory sets); restoration and original construction (home-brews); parts substitution or rebuilding; finish (cabinet, parts, wiring, insulation, connections, etc. Has the entrant done a craftsmanlike job on the restoration? A super finish does not earn extra points; no points are lost for the ravages of time alone.)

4. Supporting and Illustrative Documentation

Instruction books, service notes, production documents, dealer advertisements, etc.; construction data, plans for kits; original constructor's plans or sketches (home-brews); company history (Has the entrant made the extra effort to gather the supporting information to tell the story of the set on display? Does the illustrative material add significance to the entry? Would the supporting material be competitive by itself?)

During the years that we have been involved with the Old Equipment Contest, quantity and quality have greatly increased. We hope to see you all at the Conference. Happy hunting!

was designed with large surface areas for better sound reproduction. There are many fine examples of this type of speaker, i.e. Tower Adventurer, Western Electric,...

17. Test Equipment

This is a relatively new category for the contest. Many people have asked for it. There were many makers of test gear. A short list would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, RCA, and too many others to list. So surprise us, bring in the unusual or the common.

THE TRANSMITTER CATEGORIES

18. Spark Transmitters and Artifacts

Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

19. Vacuum Tube Transmitters

Some of the sets for this class are old, some not so old, most home-built. While the predominant entries have been amateur-operated, commercial equipment is welcome.

THE CRAFTSMAN CATEGORIES

20. Restoration of Appearance

The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set to be entered. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details.

21. Restoration of Operation

This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transistorized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates that restoration. An entry should be accompanied by documentation showing the basis of the update that preserves the quality of the original.

22. New or Rebuilt

Previously we have encouraged entries that showed the conference attendees how substitutions and reconstructions would provide vital parts or pieces. We also encouraged craftsmen who had made an old function come alive again to bring their work for review. Do you remember the Federal receiver that was entered several years ago and the operating Marconi coherer detector from a little more recent contest? We want to continue that tradition, so bring in your retrospective designs and your reconstructions. There is no requirement for particular devices or circuits.

23. Tubes

In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological break through, etc. The display should tell a story.

THE CONTEST AWARDS

In addition to the prizes ranking winners in each contest category, there are five special prizes to be awarded to outstanding entries as follows:

Elle Craftsman, Given in memory of Bruce Elle to the builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter, Given for excellence in constructing or restoring transmitting equipment.

Display, Recognizes the entry considered to have the best informational value and quality.

Thompson Best of Show, Awarded in honor of early amateur Eunice Thompson, W1MPP, to entry considered to be the overall best.

People's Choice, Awarded to the entry that receives the most favorable votes from attendees and visitors to the contest. All entries including displays are eligible for this award.

MIKES AND MEN

EDITED BY **GEORGE A. FREEMAN**, 101 E. MAIN ST., MADISON, IN 47250-3411. PHONE (812) 265-6878.
PLEASE INCLUDE SASE FOR REPLY.

The Mic: RCA Type 1 The Man: Bob Paquette

Western Electric made this double-button carbon microphone in the early to mid 1920s. Prominent microphone collector Bob Paquette (holding the Type 1 in the picture) points out the mic is a W.E. model 369 with one modification. The "bridge" (horizontal front bar) says "Radio Corp. of America type 1." The W.E. model 369 was used by U.S. president Warren Harding for his 1921 inaugural address. The RCA type 1 has a handsome, solid brass housing. 1920s photos taken at Westinghouse radio station, WJZ, Newark, NJ, show two of these mics side-by-side mounted on a shared candlestick base.

Thanks to Bob Paquette for having the picture taken especially for "Mikes and Men." Bob has just brought a long time dream to fruition. It's an 842 page book, "The History and Evolution of the Microphone." The two-inch thick, six-pound book, in an 8¼" × 10¾" format provides the reader a vicarious tour of Paquette's 50 year collection of microphone artifacts and ephemera. Bob has been in the commercial sound industry since 1947, operating his own business for the past 42 years. The book (there are only 500 in this initial printing) costs $110.00 + $5.00 S&H (U.S.). Send orders to Bob Paquette, 107 E. National Ave., Milwaukee, WI 53204.

Bob Paquette with his RCA Type 1.

Nazi Radio Label

Reader Jean Ritzenthaler of Geneva, Switzerland was kind enough to send information on a typical warning label attached to radio receivers in German households during World War II. (See my column "Traitor!" in the last *OTB*.) He provided both the original German text and an English translation:

Denke — Daran

Das Abhören ausländischer Sender ist ein Verbrekchen gegen die nationale Sicherheit unseres Volkes. Es wird auf Befehl des Führers mit schweren Zuchthausstrafen gesendet.

Think — Be aware

Listening to foreign radio stations is a crime against the safety of the people of our Nation. At the command of the Führer, this will result in imprisonment and severe punishment.

Jean recommends the following book to those who would like to read more about restricted radio listening in Nazi Germany: It's *Hitler's Airwaves, The Inside Story of Nazi Radio Broadcasting and Propaganda Swing* (sic) by Horst Bergmeier and Rainer Lotz. Published 1997 by Yale University Press, New Haven and London, ISBN 0-300—06709-7.

BELOW 535

EDITED BY **FRANK LOTITO, K3DZ**, 1428 O'BLOCK RD., PITTSBURGH, PA 15239

PLEASE INCLUDE SASE FOR REPLY.

LF Antennas, But More Like Tiny Stubs

The topic of universal interest to all amateur radio operators is the antenna. The antenna is the "transducer" that converts our transmitter's output power (volts times amps in the feed line) into useful electromagnetic radiation. For reception the reverse happens. The antenna converts the intercepted electromagnetic radiation to power for delivery to the radio receiver. Socially, the antenna is an outward sign to the world that "a ham lives here." The antenna can be a rather meek statement, an almost invisible wire snaking through the trees. It can be a Herculean statement which frequently attracts every bird in the neighborhood, including the nebby 'ol buzzard down the road that can not fully appreciate the aesthetic beauty of our engineering marvel! But what about the LF antenna? Common knowledge tells us LF antennas are an exercise in futility. Not so! Our European, British, and South Pacific cousins operating at 73 and 132 kHz, and on the experimenters no-license 160-190 kHz North American band have certainly proved otherwise.

Let's start with a few basics before we get into a brief examination of the most successfully deployed LF antenna design, the base and top hat loaded vertical. The time-honored formula approximating the physical length of a ½-wave dipole antenna is:

length in feet = 468 ÷ frequency in MHz

Without worrying about correction factors, and other physical concerns, Table #1 shows what physical length it takes to string a dipole for various frequencies[1]:

TABLE #1

frequency MHz	length in feet	length in miles
3.565	131.3	0.0249
1.810	258.6	0.0490
0.190	2463.2	0.4665
0.160	2925.0	0.5540
0.132	3545.5	0.6715
0.073	6411.0	1.2142
0.014	33428.6	6.3312

My gosh, no wonder 80 meters is considered to be short wave! A different perspective on antennas can be seen from Table #2:

TABLE #2

length in feet for an actual vertical	frequency MHz	% of the wavelength
65.64	3.565	25.00
129.29	1.810	25.00
30.00	1.810	5.80
4.96	1.810	0.96
50.00*	0.180	0.96
200.00	0.180	3.85

**The 50 foot length represents the present 47CFR15.217 legal limit for the no-license 160-190 kHz experimenter's band.*

No doubt an amateur operating an almost five foot tall vertical against a very poor ground system on 160 meters finds himself facing concerns not that different than the no-license band experimenter that is limited by the present 50 foot maximum legal antenna height rule. The efficiency of their antennas is not much better than a high loss "stub." Hopeless? Not really, read on.

The poor efficiency of short vertical radiators can be demonstrated with simple to use and inexpensive computer based antenna modeling programs such as EZNEC[2]. The EZNEC developer admits there may be errors when his program is used to model short radiators[3]. But at least trends can be seen, and estimates made. Table #3 illustrates the modeling results for the simple vertical radiators at 180 kHz. For what it is worth, the following criteria were used for the EZNEC model:

1. medium ground conductivity and dielectric constant

2. a radiator with a diameter chosen to be somewhat practical for actual construction

3. the first foot of the radiator is a #10 AWG wire, the middle of the wire is the feed point, and one end is the single ground connection (no radials used)

TABLE #3

SIMPLE 180 kHz BASE DRIVEN VERTICAL RADIATORS OVER MEDIUM GROUND

(real/MININEC: conductivity 5 x 10-3 Seimens, dielectric const 13.00)

vertical radiator height in feet over the 1 foot feed	vertical radiator equivalent diameter inches	radiation resistance Ω	capacitive reactance Ω	theoretical* best efficiency in %
49	2	0.0550	9892	0.11
131	12	0.6861	5804	2.31
199	24	2.233	5102	8.05

**Calculated as follows: (100) (base loading coil's unloaded Q) (radiation resistance) / (antenna reactance + base loading coil's unloaded Q {radiation resistance}), assuming base loading coil reactance = antenna capacitive reactance, and there are no other losses*

TABLE #4

TOP LOADED 180 kHz BASE DRIVEN VERTICALS OVER MEDIUM GROUND

(real / MININEC: conductivity 5 x 10-3 Seimens, dielectric const 13.00)

vertical radiator height in feet over the 1 foot feed at base	vertical radiator equivalent diameter (")	top hat loading	radiation resistance Ω	capacitive reactance Ω	theoretical best efficiency in %
49	2	none	0.0550	9892	0.11
131	12	none	0.6861	5804	2.31
49	2	132 foot long #10 AWG horizontal wire, 50' high, vertical radiator connected to ctr.	0.1522	3884	0.78
131	12	none	0.6861	5804	2.31
131	12	four 90° spaced #10 sloping wires each 66' long and 30° to horizon	1.287	3498	6.85
131	12	same as above, plus #10 wires connecting the free tips	1.430	2552	10.08

4. a non-radiating point sized base loading coil with an unloaded Q of 200. The total losses are lumped into the base inductor Q. The total loss is the copper loss, radiator skin effect resistance, coil coupling to its surroundings, insulator loss, and ground return loss.

Most definitely the modeling predicts an extremely low radiation resistance for short (measured as % of wavelength) verticals. Radiation resistance is a mathematically defined entity that simulates energy loss due to electromagnetic radiation. A large radiation resistance in comparison to the total of all other resistive losses plus radiation resistance means high antenna efficiency. In order to maximize efficiency of a short vertical antenna the important design goals are:

(1) tallest radiator possible (maximizes radiation resistance)

(2) top loading (increases radiation resistance, lowers loading coil's required inductance

(3) high Q loading coil (minimize matching losses)

(4) extensive ground system (minimizes ground return loss)

(5) low-loss insulators (minimize corona and dielectric loss)

From the design goals, notice the goal for low-loss insulators. In the primeval days of radio when "Spark Was King," it was well recognized

that insulator resistance to corona discharge, surface contamination, etc. was a loss that could not be neglected. The significance can be seen in our models of Table 3. For example, with the 50 foot model, a current of 1 ampere rms injected into the bottom of the base loading coil would produce a voltage of almost 10 kV at the vertical radiator connection point to the top of the coil. Our UK brothers are pushing up to 5 amperes RMS into their coils!

A major item in the ARRL Petition[4] for establishing formal amateur radio assignments at 132 and 160/190 kHz is the elimination of the present 50 foot max antenna height restriction. For those hams with the necessary resources, taller top loaded antennas will definitely raise the LF antenna's efficiency! This is shown in the Table #4 where EZNEC was used to analyze a few top loaded designs. As height increases and top loading is utilized, there is a decisive increase in radiation resistance. A second effect of increased height and top loading is the lowering of the inductance required for the base loading coil. Thus with a Q of 200, the inductor's resistive loss is smaller. The concept of top loading to improve antenna efficiency was definitely know in the early days of amateur radio[5].

For reception on LF, amateurs and experimenters have used their transmitting antenna, as well as antenna design types that are generally not considered suitable for use as transmitting antennas. The more popular "non-transmitting type" receiving antennas are shielded and unshielded loops. The simpler receiving loop designs go back to the early days of radio[6,7]. Many of the more successful present day receiving loop designs are shielded types employing ferromagnetic core material.

Ferromagnetic powdered core materials were known and used in the 1920s[8]. (I do not know if core materials were used for receiving antenna designs prior to the 1930s.) A few present-day LF experimenters and amateurs attempted to use ferromagnetic cores for their transmitting antenna's base loading inductor. They had poor success.

The construction techniques used for the present day base loading inductor is not very different than used in the pre-WW1 era, a large diameter low-loss coil form plain solenoid wound with fine-strand/large-wire-gauge Litz wire, if one could afford Litz wire. On the LF web pages you can find articles on base loading LF coil designs supposedly producing unloaded Qs of 400.

Small loops can be used for transmitting at LF. However the antenna efficiency is extremely poor. The low efficiency is due to an almost infinitesimally small radiation resistance in comparison to other resistive losses in the antenna and matching system. The receiving loop's claim to fame is its directional characteristics. If the loop is properly constructed and located in the environment, it can have very symmetrical deep nulls and narrow bandwidth that can help minimize adjacent and co-channel interference. The receiving loop's low sensitivity and high losses are overcome with a high gain preamplifier immediately after the loop. In today's technology miniature high gain/low noise preamps can be located at the loop's balanced output connector.

The techniques used to design and construct practical LF antennas are the same as used for HF limited space and mobile antennas. These construction techniques can be seen in the classic set of articles on HF ground-mounted short-loaded vertical antennas by W7FMI[9]. The mobile HF antenna differs from the LF antenna in two areas: a significantly smaller diameter top hat, and no possibility for a low-loss ground return. Despite the HF mobile antenna's short-comings, they do radiate! Most of us have worked 80, 40 and 30 meter mobile stations, maybe even 160 meter mobiles. Amazing, those HF mobiles can radiate signals across the state line!

Bottom line, on a modest suburban dwelling lot, amateurs and experimenters have constructed successful LF antennas that have allowed their beacons to be heard 1600+ miles away, and engaged in 2-way CW and digital mode QSOs at path lengths of 100 to well over 1000 miles! Not bad for a stub-type high-loss antenna. Prior to WW1 our grandfathers were launching and receiving 425 kHz relay messages across the county and even the state line using absolutely primitive transmitting and receiving apparatus, *and LF antennas not very different than the modern LF experimenter/ham's antenna*. One now asks the present day prognosticator, "what's your excuse for not putting up some type of antenna for 40, 80 and 160 meters?" Certainly not limited space? For those with a suburban lot, why not consider setting up equipment for 160-190 kHz, or even 132 kHz?

More information on this topic can be obtained from the RSGB's "LF Experimenter's Source Book" and from the Internet at the following URLs:

a. **www.lwca.org** Long Wave Club of America, a wealth of information on LF equipment, antennas, antenna loading coils

b. **www.amrad.org** AMRAD, look up their 132 kHz activities and LF links

(continued on page 27)

BY H. RICHARD CRANE, PH.D.

COHERERS REVISITED

This article came about through some correspondence between Professor Frederick Seitz of Rockefeller University and H. Richard Crane, Professor Emeritus of Physics at the University of Michigan. The correspondence involved the history of silicon in electronics. (Prof. Seitz is the author of Electronic Genii—the Tangled History of Silicon, *University of Illinois Press, 1998.)*

Somehow the subject of coherers came up. Professor Crane had attempted to build and test a coherer as young radio amateur in the 1920s—but without success. Now, a career in research behind him and modern laboratory equipment at his disposal, he was going to try again. Professor Seitz encouraged him to publish the results in The OTB, *and here they are.*

Many readers will remember that Prof. Seitz was instrumental in arranging for The OTB *to publish Dr. John Bardeen's talk "The Early Days of the Transistor: 1946 to 1955" (February and May 1999 Issues). Prof. Seitz has also recently published a monograph on radio pioneer Richard Fessenden (see the book review column in this issue).*

Readers interested in experimenting with coherers will also want to review an earlier OTB *article (May, 1996 issue): "Experimenting With an 'Antique' Radiowave Detector" by Igor Halley and Leonid Kryzhanovsky.—MFE*

About the Coherer

A century ago the coherer held the center of interest as a device that could detect an electromagnetic signal. Its unlikely looking construction leads one to wonder what line of reasoning could have led to it. But maybe the name coherer—sticking together—holds the right (or wrong) suggestion. We may see.

I learned a lot about early coherers from an old book that contained many details about these devices[1]. The coherer was typically made in a piece of glass tubing, evidently 3 or 4 mm inside diameter, into which fitted metal rods, leaving a gap between them of a few mm. The gap was partly filled with metal filings, of silver or some other metal.

The electrical characteristics of coherers are simple. If the filings are shaken up, usually by tapping on the glass tube, and an increasing voltage is applied between the two rods, no current flow is at first observed. At a certain threshold voltage, however, the coherer suddenly becomes a conductor. In that state its resistance is low enough, typically about 50 Ohms, so that current through it can close a relay or activate a soundmaker. The device stays in that conducting state until the voltage is lowered to below the threshold value and the filings are shaken up.

In the application of detecting a radio signal, the coherer is put into the conducting state if the signal voltage rises above the threshold—ringing a bell or whatever. After the radio signal has ended, it is only necessary to tap the coherer to go back to non-conducting because, without the radio signal, the voltage across it will be below threshold.

The coherer can be made to respond to a weaker radio signal if it is biased with DC up to near—but safely below—the threshold.

Experimental Method

I decided not to enclose my experimental coherer in a glass tube, but to leave it be open, so it

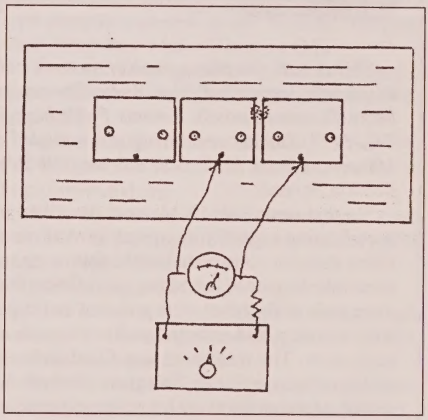


Fig. 1. The experimental arrangement for measuring thresholds.

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would be easy to try different filings and to change the length of the path through the filings.

The coherer and the measuring circuit are shown in Fig.l.

Three one-inch squares of sheet copper are mounted on a board, with gaps of 1 mm and 2 mm. A variable voltage supply (0 to 100 V) can be connected across either of the gaps through a 1000-Ohm resistor. The heap of filings is shown on the 2 mm gap.

The meter shows the voltage through the filings as it is run up. When conduction occurs, at the threshold, the meter drops to near zero as the voltage drop shifts to the resistor. All measurements were made with DC. We have to take it on faith that the coherer would respond the same to a high frequency (radio) signal. I had no way of applying and measuring such a signal.

Filings were made from various metals, including a dime (which is mainly copper) and a nickel coin. For each test, a small heap of filings (estimated at 3 or 4 cubic mm) covered one of the gaps between the copper plates.

With the voltage below threshold or off, the board with the coherer on it was tapped to shake the filings. Then the voltage was run up, and the voltage at which conduction suddenly occurred (the threshold voltage) was recorded. This was repeated ten times at each of the two path lengths. For each material, the experiment was run with batches that had been filed at different times in the past.

Findings

The observed thresholds for nickel and dime filings are shown in the table. Each figure is the average of ten trials. The trials varied about 10% either way. The pronounced aging effect was not expected. That prompted me to extend the experiment back to zero age. Another surprise! Fresh filings would not go non-conducting no matter how much they were shaken. They began to act as coherers only after a day or more had passed.

Average Thresholds For "Dime" Filings

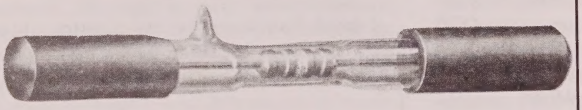
Age After Filing	3 Days	3 Months	6 Months
1mm Gap	8.9V	12.4V	16.3V
2mm Gap	13.7V	20.7V	29.8V

Average thresholds for "Nickel" Filings

Age After Filing	11 Days	3 Months	6 Months
1mm Gap	7.5	12.1	18.1
2mm Gap	11.7	18.5	27.5

These two observations suggest that oxidation of the filings plays the key role and that: (1) a certain minimum oxidation is required for coherer action at all and (2) further (thicker) oxidation built up over a longer time causes an increase in threshold. The mechanism seems to be that the oxide layer, which may need to be only a few atoms thick, insulates the filings from one another up to a certain applied voltage (the threshold), at which point it breaks through, and stays broken through. The shaking action gives the filings all new points of contact with one another—contacts that have not been penetrated.

To test this idea, an experiment was done to see if the time required for minimum oxidation of fresh filings could be shortened. Fresh copper filings were heated in the kitchen oven. After many tries at different temperatures and times, it was found that heating at 225 degrees Fahrenheit for about 5 minutes made the filings act as



This actual-size photograph of an early coherer in an evacuated tube was taken from Radio Theory and Operating *by Mary Texanna Loomis, Loomis Publishing Co., Washington, DC, 1927. The accompanying text included a discussion of a Marconi coherer as described in an 1890 British patent specification. It read:*

"In that same year G. Marconi described in a British patent specification a greatly improved form of metallic-filings oscillation detector constructed in the following manner: In a small glass tube he placed two silver plugs fitting the tube tightly. The inner ends of the tubes were polished and slightly amalgamated with mercury and brought within a couple of millimeters of each other. The interspace was filled with a small quantity of nickel and silver filings. The glass tube was then exhausted and sealed. Marconi thus constructed an extremely sensitive form of imperfect contact oscillation detector, which under the influence of feeble oscillations set-up by electric waves passed from a condition of high resistance to a condition of low resistance."—MFE

coherers immediately—no waiting,

The reverse experiment would be to see if placing the filings in an inert atmosphere would extend the waiting period. Helium is available in small tanks for filling toy balloons, This might be something for an interested reader to try!

A further remark; The idea that conduction is caused by the filings being physically, aligned or drawn more tightly into contact when voltage is applied (as may have accounted for the term coherer), seems to be unnecessary as well as energetically impossible. A radio signal from any distance farther than the laboratory would have far too little energy to move filings.

Coherers are fun. I recommend playing with them! There are still things to learn. I think a century ago they were taken for granted without much careful measurement. People were just thankful that they worked at all.

Author H. Richard Crane, 6AFQ, at his Turlock, CA ham station in 1923. (Photo: AIP Emilio Segrè Visual Archives)

REFERENCES

1. *Wireless Telegraphy, for Amateurs and Students.* By Thomas M. St. John, Met. E. Published. by Thomas M. St. John, New York. Copyright 1906.

BELOW 535, *continued from page 24*

c. **www.qrz.com** Look up the calls VE3FMQ on the LWCA member's web page, and the calls G3YXM and G0MRF on QRZ.com for their web pages on 73 and 132 kHz (great up to date info)

d. **www.rsgb.org** Radio Society of Great Britain, search their site for 73 and 132 kHz information.

REFERENCES:

(1) Starting from the top, the frequencies chosen represent the "center" frequency for the 80 meter AWA '29 meter QSO Party, December 1999; an AWA frequency for the 160 meter QSO Party; the top end of the no-license band; the bottom end of the no-license band; the overseas LF assignments (132 and 73 kHz); and what was a "typical" OMEGA Navigation frequency.

(2) Contact Roy Lewallen, W7EL, for information on EZNEC and other antenna modeling programs. EZNEC can run on a low-end 80386 type computer, as well as on "modern" Pentium class computers with a Windows O/S.

(3) Peter Dodd, G3LDO, *The LF Experimenter's Source Book*, 2nd Edition, RSGB, 1998, page 6.12

(4) See *ARRL Bulletin ARLB095*, 3 Nov 98, and the petition text, both available online at http://www.arrl.org

(5) S. Ballantine, *Radio Telephony for Amateurs*, David McKay Co., Philadelphia, PA, 1923 edition, pages 58-63

(6) *Ibid*, pages 92-95.

(7) H Lauer and H. L. Brown, *Radio Engineering Principles*, McGraw-Hill Co., NY, 1920, first edition, pages 261-267.

(8) J. H. Morecroft, *Principles of Radio Communication*, John Wiley & Sons, NY, second edition, 1927, pages 177-178.

(9) *ARRL Antenna Book*, 13th Edition, 3rd printing, 1974, page 213.

BY D.K. OWENS

RESTORING ATWATER KENT POWER PACKS

A lot of fine metal-cabinet Atwater Kent receivers have been junked because their owners considered power pack restoration to be beyond their capability. As you will see, it's not that formidable a job once you know what's inside and can identify the connections.

The Atwater Kent power pack evolved from the Type R battery eliminator. Starting as a separate unit in the first AC Model 36, it was moved inside the radio cabinet in the Model 37 and reached its final form in the Model 40 and all subsequent metal-cabinet sets.

This final version is a narrow, one-piece box with a lid and looks like a miniature version of the radio cabinet. Dividers form 3 approximately equal compartments to contain the electrical parts.

Viewed with the rectifier socket on your left, the left hand compartment holds the power transformer, the middle holds the two filter chokes, and the right hand compartment contains all the capacitors and the plate choke for the 71A output tube. After the parts were installed and connected, the compartments were sealed with tar—which hides everything and complicates matters.

Testing the Power Pack

The first step, as with any AC set, is to test the power transformer. First, check for an open primary by measuring continuity across the line cord. Short the toggle switch with a jumper wire in case it is corroded or bad. The "regulator" Models 42 and 44 use a wirewound ballast resistor in series with the primary to cope with line voltage variations. It is located under a bracket behind the rectifier tube and may be open. The AK manual gives its cold resistance as 28Ω for Model 42 and 21Ω for Model 44. Never having had to replace one, I have no recommendations, however, don't try to operate the radio without this ballast.

Next, check for shorted turns. Although I have lots of instruments to measure the primary current, I still prefer the simple tester shown in Fig.

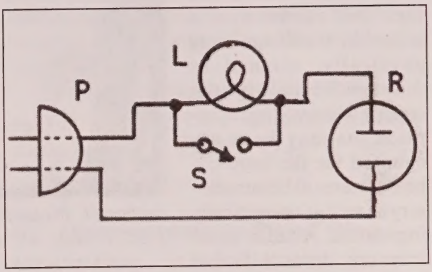


Fig. 1. Simple lamp tester shows power transformer condition at a glance.

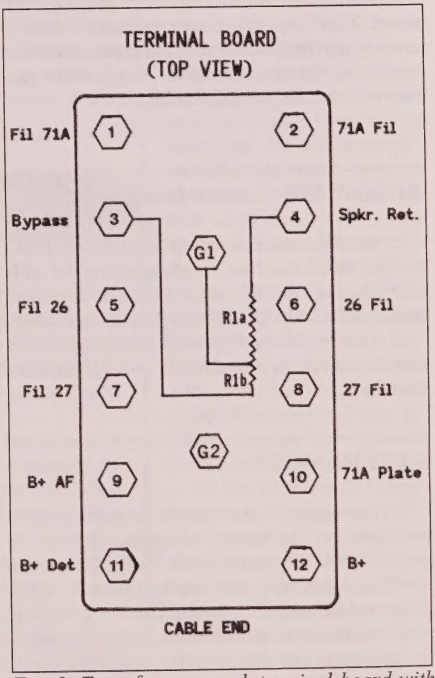


Fig. 2. Top of power pack terminal board with cable removed.

478 SYCAMORE DRIVE, CIRCLEVILLE, OH 43113

TABLE 1. ORIGINAL PARTS VALUES

C1, C3 = 1.0μF
C2 = 1.5μF
C4, C5 = 0.5μF
R1a = 2200Ω
R1b = 625Ω (500Ω in Model 44)
Rf = 20Ω CT
R2 = 12.5kΩ
R3 = 65kΩ
CH1+CH2 = 1350Ω (1400Ω in Model 44)
CH3 = 550Ω (500Ω in Model 44)

1. P is an AC plug, L is a 100W household lamp, and R is an AC receptacle. Switch S allows the lamp to be shorted out of the circuit. The tester will let you know the status of your power transformer at a glance. It also limits primary current and protects the set.

Remove all tubes from the set and make sure they are good. Check the wires in the large power supply cable, they often break at the lugs on the cable connector board. Repair any broken connections. With the test lamp in the circuit, apply AC and turn on the set. A good power transformer draws almost no current with no load, so the lamp should remain dark. Any glow at all indicates shorted turns. If the transformer has a problem, you can stop here. Unless you can find a good transformer, you have a parts set.

Turn off the set and replace all tubes *except the Type 80 rectifier*. Turn the set back on. The lamp may glow faintly with the filament load on the transformer. Locate terminal 12 using Fig. 2. Set your meter for 500V DC and connect it between terminal 12 and chassis. With the set still on, insert the 80 and watch the lamp.

The lamp will brighten. A good set with no shorts will light the lamp half brightness or less. Seven-tube sets like the Model 40 draw about 40 watts and 8-tube sets (Model 44) draw about 60 watts. The voltmeter should indicate 150-220V if all is well. If the lamp glows brightly and the meter shows little voltage, turn the set off quickly and get ready to melt tar.

Your filter capacitors may be good initially, but may very well fail later. Leave the set on and monitor it constantly for several hours. Any sudden increase in lamp brightness or decrease of voltage indicates capacitor failure. Stay by the set during this test.

Although open chokes are rare, you need to know their resistances for use later. Disconnect the set from the AC line. Short terminal 12 to chassis for 1 minute to completely discharge the filter capacitors. Connect your ohmmeter between terminal 12 and pin 1 of the rectifier socket. Your value should be close to that in Table 1 for both filter chokes in series. Measure the 71A plate choke between terminals 10 and 12 and compare with Table 1. Write down your readings.

Power Pack Description

Remove the nuts holding the cable connector board to the power pack. Remove the receiver chassis from the cabinet to make room to work. You will probably need to replace some parts on it anyway.

Fig. 2 shows what you see when the cable connector is out of the way. The function of each terminal is identified. The flat, wirewound resistor on top of the terminal board is the combined bias resistors for the 71A and the Type 26 tubes. Measure the resistance of both sections and compare with the values in the Table 1. If either section is open, note that for later.

On the underside of the board (Fig. 3) are 5 resistors which you will see when we get to that

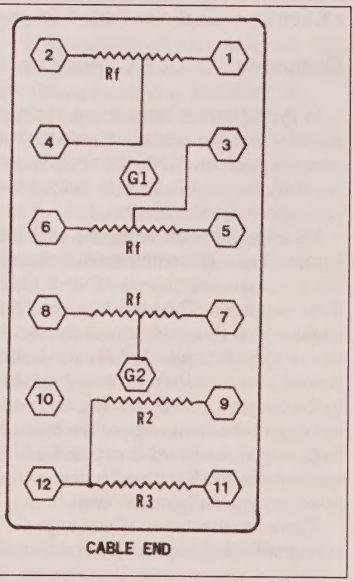


Fig. 3. Underside of terminal board showing resistor hookup.

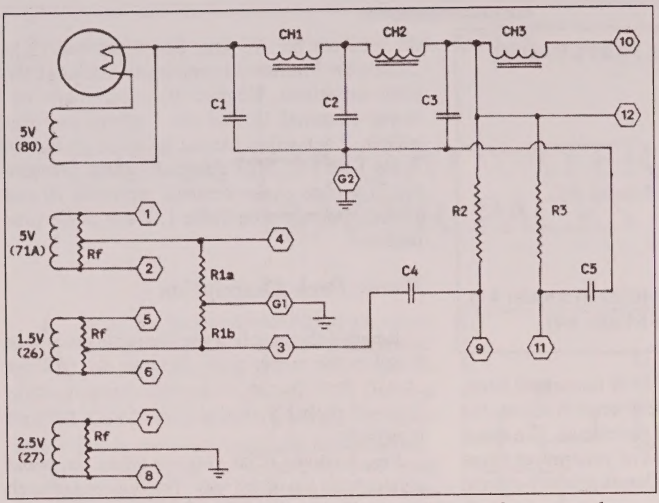


Fig. 4. Power supply is conventional in design. See text for parts values.

part of the restoration. Three of them are flat, wirewound, center-tapped resistors for the filament returns. The others are carbon-in-glass cartridge resistors mounted in clips.

Fig. 4 is the diagram of the power pack showing how the terminals are connected. It is a standard circuit—nothing unusual. Values from the AK service manual. See Table 1 for parts.

Removing the Old Capacitors

In the following instructions, the back of the power pack is the side adjacent to the back of the receiver cabinet. With the rectifier socket on your left, the back is the side farthest away from you and the front is closest.

Unsolder all wires along the back side of the terminal board (even numbered terminals). Mark the wires from terminals 10 and 12, and treat them carefully. They are attached to the plate choke which you must save and reuse. Unsolder the wires from terminals 3, 9 and 11 on the front. Remove the nuts from the two ground terminals in the center of the board, lift the board up and lay it over the front edge of the case. When the back side of the board is exposed, check the filament resistors (Rf). Don't bother with the glass resistors; you will replace them.

There are two types of power pack. The first type embedded the capacitors directly in the right hand compartment. If a capacitor failed, the entire pack had to be replaced. Atwater Kent soon realized that this was wasteful and unnecessarily expensive for the owner. Later versions were modified by potting the capacitors and choke in a separate metal box which was dropped into the compartment. In case of failure, the wires to the bad unit were cut or unsoldered, it was lifted out, and a new unit dropped in. Its leads were spliced to the cut wires from the rest of the power pack. The later type has a metal strap across the capacitor unit to hold it in place. The approach to capacitor replacement depends on which type you have.

If your power pack is the first type, the whole thing must be removed from the radio cabinet. Disconnect the primary AC leads which enter the pack through the same hole as the large cable. Remove the bolts from the ends of the base flange and the three bolts holding the back of the pack to the back of the cabinet. Now you can lift the pack out of the receiver cabinet.

Look carefully at the pack. There is a wire going from the left hand compartment into the center compartment. This is the B+ input from the rectifier tube. Leave this wire alone. There are three wires going from the center compartment into the right hand compartment. They are the input, center and output of the filter choke string. Cut these 3 wires at the surface of the tar *where they enter the right hand compartment.* Leave as much wire extending out of the center compartment as possible. Before you cut anything, read these instructions again. Unsolder the bare wire coming out of the capacitor compartment to the lug under terminal G2.

If you are married, you will need your wife's cooperation. Get permission to use her oven. Obtain a disposable aluminum pan of the kind used to roast turkeys. Set the oven for 275°, put the entire power pack *upright* in the pan and put both in the oven.

This operation is smelly, so use the exhaust fan or open the window. Oven thermostats are not accurate. If the tar begins to smoke, your oven is too hot; turn it down. Check the process periodically by poking the tar in the right hand compartment with a stick. When it has the consistency of molasses, remove the power pack from the oven and take it outdoors to avoid stinking up the house any more than necessary. Use

heavy gloves; it's hot. Work quickly to extract the contents of the compartment before the tar hardens. The parts were tightly packed into the compartment before the tar was poured and don't come out easily. Don't even think of pulling on the wires. The best tool for extracting the old capacitors is a sturdy, old-fashioned corkscrew — the kind with a wooden handle.

Insert the corkscrew into the compartment about ½ inch from the front edge of the case and roughly centered between terminal G2 and the end of the case. Screw it in until it has a good grip and pull straight up slowly and steadily. When the first capacitor is out, the others come out more easily. When you get to the back of the compartment, be very careful. This is where the plate choke is located.

If the tar isn't too cool, you should be able to lift out the plate choke by its wires. If it doesn't come out easily, heat the pack some more. The choke is a cylindrical object connected to the capacitors by a single wire from the same point where the long wire to terminal 10 is attached. Cut this wire where it joins the capacitors leaving as much wire as possible attached to the choke.

The choke and wires will be covered with tar and quite messy, but you don't need to clean them. Scoop the excess tar out of the empty compartment with a stick or old spoon while it is still soft, but the compartment needn't be absolutely clean. Wipe off any tar on the outside of the case while it is hot. Set everything aside to cool.

If your power pack is the later type, the procedure is the same except you don't need to remove it from the radio cabinet. Just remove the hold-down strap, cut and unsolder the wires as described above, and lift the capacitor pack out of the case. I put these units in the oven upside down on a pair of small wood blocks so the tar can run out as it heats. Be sure that you unsolder, not cut, the wires to terminals 10 and 12.

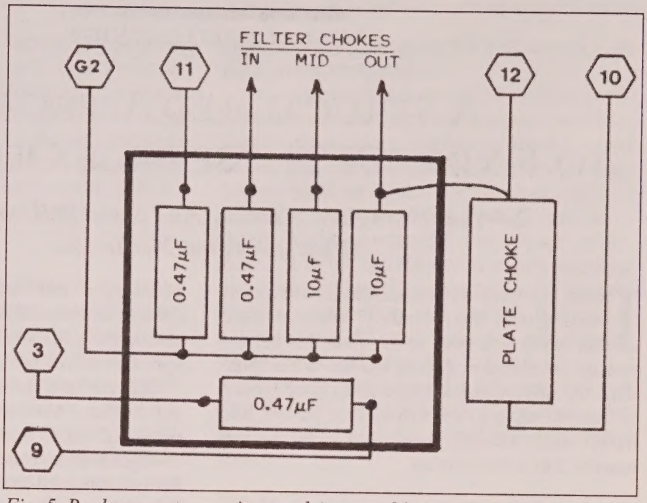


Fig. 5. Replacement capacitor pack is assembled on perfboard as shown.

Making the Replacement Capacitor Pack

The voltage output of a capacitor input filter is dependent on the size of the input capacitor. If the original value of 1μF is used, the B+ voltage runs too high with modern line voltage, so I use a 0.47μF/600V Mylar unit for the first filter. I use 10μF/450V electrolytics for the other two. This combination gives the proper voltages and low hum.

The two bypass capacitors are not critical. You can use the original values or you can use 0.22μF units. They should be rated at 400-600V DC.

Arrange the capacitors as shown in Fig. 5 on a piece of plain perfboard cut to accommodate the capacitors and also to fit the compartment. Stick the capacitor leads through the board and bend them to anchor them. Connect them as shown and attach lead wires. There will be 9 wires, so mark each carefully. Connect the plate choke to the capacitor pack with the original connecting wire which you left attached. It is old, brittle and covered with tar. It isn't easy to strip and clean the end, so work carefully.

When the wiring is completed, cut a piece of thin cardboard slightly larger than the pack and twice as long. Coat it with shellac for moisture proofing. When dry, fold it around the capacitor board and tape it in place. This will insulate the pack and keep it from shorting to the case.

Installing the New Capacitor Pack

Drop the capacitor and choke assembly into the compartment or box. I leave them loose in case they ever have to be removed for servicing.

(continued on page 34)

BY BILL FIZETTE, W2DGB

A Structured Approach to Fixing up Those Nice Old Radios

2—Your Work Area...Tools...And Some Philosophy About What and What Not to Do.

In the last issue we introduced the subject of working with "the old radios" and established that while you have never done this before, you are interested in getting started. We emphasized the importance of researching your project before you begin to disembowel the patient, and listed some readily available information sources. Let's continue on.

The Work Area

Sure, you can work on a kitchen table, or even on the floor of your bedroom, but it is darned inconvenient. You actually need a private dedicated work area where you can lay out your project and come and go as your situation dictates. Consider it your very own personal radio laboratory space. I use a discarded kitchen counter with drawers—with the sink hole filled in—located against a basement wall. The height is right for standing, and the three feet of clear bench area that results after my tools and parts and bits and pieces of junk take up the rest of the space is about right.

The drawers contain tools and some parts. Overhead is a four-foot fluorescent light fixture as well as a reflector with a 100-watt incandescent bulb. The reason for the dual light source: Often I have to turn off the noisy fluorescent to listen to a radio. I layer the work surface with a piece of corrugated cardboard, bent up in back to save those small parts from disappearing into oblivion, to which I have added clean newspaper. As the latter gets torn and dirty, it is easily layered off and discarded.

No space? One correspondent tells me of someone who adapted a closet, and another who converted an unused dumbwaiter. Use your ingenuity.

Against the wall I have some shelves for test gear, with the three most commonly used items at eye level directly over the work area. These are the VTVM (vacuum-tube voltmeter), the capacitor checker, and the signal generator. On the shelf and on each side I have mounted polarized 110VAC power outlets...you can never have enough of these. Running along a ceiling joist and down to the work area is a 15-foot piece of wire that serves as a makeshift antenna.

OK, we have the work area, but before we go any further, I must emphasize that working with these old radios involves potentially LETHAL voltages and currents, far different in concept than the modern solid-state circuits. By lethal I mean that they can kill you if you do something stupid.

The early AC sets from the late 20s and 30s and even the early 40s used hot-field loudspeakers as a part of the filter circuits. This was before the invention of the powerful Alnico magnets used commonly today in PM speakers, which eliminated the need for the heavy and expensive field coil. The input voltage to the filter circuit in the old AC receivers was often 350 volts, high enough to power a small transmitter, and with a working current of anywhere from 50 to 100 mA. DON'T TAKE CHANCES...KILL ALL CIRCUITS BEFORE WORKING ON THEM. To do this, pull the AC plug from the source, and discharge the filter capacitors by shorting them to ground.

It wouldn't hurt to have a dehumidifier going if you are in a humid basement area, and a nonconductive rubber mat to stand on. Damp basement floors are notoriously hazardous when working with electricity. Finally, don't work on live circuits if you are tired...pack it in and pick up later when you are fresh. It takes only a fraction of a second to electrocute yourself.

Let's take this one step further. Install a GFI (ground fault interrupter) outlet, an excellent and inexpensive safety feature. Connect your other workbench outlets to the "load" side, and all the outlets will be protected.

Soldering Tools

I use a 40-watt iron, a good compromise for tube-circuit components. I also keep a 100-watt

AUTHOR'S ADDRESS: RR 1, BOX55, HENRYVILLE, PA 18332

iron in the drawer for those heat-sucking ground connections to the chassis. A good radio solder is a must. And don't use soldering paste unless it is absolutely necessary for a badly corroded joint or piece of wire that can't be cleaned, and then only the smallest bit. Believe it... sooner or later (it may take years) the acid will corrode the joint.

Hand Tools

The sky is the limit here. You will need wire cutters, various types of pliers, a small socket set, soldering probe, wire stripper, socket nut drivers, small wrenches, and so forth. As time goes on you will accumulate more items until you finally decide that enough is enough. I have discovered that medical forceps are very handy. And don't forget to make up several clip leads. Also, a clip board with paper and pen to take notes as I work along is one of my most used tools... perhaps you can remember where that red wire went that you took off last week before you went out of town, but I gave up trying. I draw sketches and make notes, and I keep all small parts and hardware in a box or small bottle. Remember, what you take apart will have to go back together.

Test Gear

You should start with three items, a VTVM, a capacitor checker, and a good signal generator or surplus military frequency meter, such as a BC 221 or the US Navy LM, or equivalent. It should have modulation. The common servicemans' signal generator is not accurate enough unless you pair it with a frequency counter.

If you are going to work on AC-DC transformerless receivers, an isolation transformer is a good idea for general safety... to avoid accidental electrocution! I picked up an old Heathkit some years ago at a hamfest, although you can make one up out of a couple of old TV transformers or a pair of Radio Shack heavy-duty low-voltage transformers, wired back-to-back. AC-DC radios are notoriously dangerous to work on unless you are very careful and know what you are doing, as it is very easy to have the chassis connected to the hot side of the line. We will discuss this later in more detail.

One of your first jobs, by the way, will be to restore the test gear to good working condition. I use a lot of old Heathkit equipment picked up at hamfests, and much of it comes to life with a little simple maintenance. We will go into more detail in the next article.

Because one of my interests is working on old short-wave receivers, I keep a continuous-coverage communications receiver on the side of my bench. This enables me to receive the WWV frequency standard signals and receiver oscillator signals in the short-wave bands. I find that a World War II surplus BC 348 is quite convenient... it is not too deep, it is totally shielded, and it has a slow tuning rate with a decent calibration. Another item that you will find convenient is one of the small frequency counters that Radio Shack and other suppliers sell.

There are other pieces of test gear that will find their way to your bench in due course, but for now, stick with the three basic items listed above.

Parts

Like information, you can't work without them. What you stock or purchase will depend on what you will be doing. At the very least, you will need a source of good electrolytic and bypass capacitors and resistors, as these are frequently the baddies in an old radio. And, occasionally, a tube or two. Don't use old electrolytics, even if they are new old stock that have never been used. They frequently won't hold up, and you run the risk of burning out an expensive and perhaps irreplaceable power transformer. New ones of adequate voltage ratings are available (but not at Radio Shack, unfortunately) through Antique Electronic Supply of Tempe, AZ, at hamfests, and of course, at the old radio meets, such as the AWA Annual Convention. Other parts can be salvaged from old TV sets and purchased from mail order houses. I salvage all hardware also.

How You Look At It

Finally, a bit of philosophy regarding this business of "fixing up" old radios. There are many "collectors" who insist that the end result of a restoration project will be a radio with a gleaming, as-good-as-or-better-than-new finish, and that plays flawlessly. Not just an occasional set, but ALL of them. If you have this thought in mind, you are not alone, but consider this. While that early Zenith is your possession, and you may do with it as you wish, remember that it is considered an "antique," and antique furniture

E-MAIL W2DGB@ENTER.NET

pieces that are essentially complete, and with the original finish, should NOT be refinished for the sake of a few dings and scratches.

In the same manner, reworking the electronics of a truly rare radio just to hear it play can also be considered a bit of sacrilege. Aside from the fact that refinished pieces can lose up to 50% of their monetary value, if we rework everything there will be fewer and fewer original pieces left for succeeding generations of collectors to study.

My own early interest was the National Company HRO communication receiver, introduced in 1934. I have a very early production run HRO (I am only the 2nd owner) that still has the original parts as well as the original black crackle finish. I have elected to leave it alone, cleaned up, but otherwise original in every respect. Since there are (or at least were) lots of original-design HROs around, I found later production versions of the same design to restore and play with. There are techniques for rebuilding original parts, and this argument seems to be never ending, so my suggestion is that you do a lot of reading to develop your own thoughts.

Next time we take a look at and perhaps restore to working condition two important pieces of test gear, a VTVM and a capacitor checker. In the meantime, start developing your knowledge base by reading and more reading. The reference I listed last time by Ed Romney is, I repeat, an excellent beginners' book.

ATWATER KENT, *continued from page 31*

You're not going to operate the radio upside down anyway. Now tighten all the terminal bolts on the board and remove the glass resistors. I use 2W metal film resistors for replacement. Values of 68kΩ and 13kΩ are close enough to the original values. Solder them to the appropriate clips as shown in Fig. 2. Don't leave the glass resistors in place; they may cause noise.

TABLE 2. POWER SUPPLY VOLTAGES

Terminal	Voltage
12	+185-205
10	+180-190
11	+35-40
9	+150-165
4	+35-43
3	+10-15

If either section of the bias resistor on the top side of the board is bad, replace it with a 2W metal film resistor of the nearest value. They are small enough to fit on the underside of the board. Disconnect the bad section of the original resistor.

Connect the ground wire from the capacitor pack to the lug under terminal G2. To connect the filter chokes, you must first identify the cut wires emerging from the choke compartment. Strip and clean the ends of these wires. Connect your ohmmeter to pin 1 of the rectifier socket and locate the wire which reads close to zero Ω. Label it "in."

Next, locate the wire which reads *one-half* the value you recorded for the resistance of CH1+CH2. Label it "mid." The remaining wire is "out." Confirm that the reading on this wire is the total value you previously recorded. Now solder these choke leads to their respective capacitor leads. Insulate these splices. A piece of shrink tubing slipped on before joining the wires can be shrunk over the joint after soldering.

Replace the holddown strap if your pack uses one, replace the terminal board, and bolt it down to the 2 ground terminals. Solder the remaining wires from the pack to their correct terminals and reattach the filament wires to their terminals. If you haven't disturbed these wires, they will line up correctly. Be sure not to interchange the wires from the plate choke. The restoration is now complete and ready for testing.

Final Testing

Check your wiring by measuring the resistance from terminal 10 to pin 1 of the rectifier socket. You should get the sum of CH1+CH2+CH3. You can power up without putting everything back in the cabinet in case you need to do further work. You should have checked the radio chassis and replaced any bad capacitors and resistors. Also check the windings of the audio transformers for continuity.

Bolt the cable connector to the terminal board and install all tubes. With the test lamp *in the circuit*, apply AC to the primary leads and be sure the lamp glows no more than half brightness. Short out the lamp and measure the DC voltages from the terminals in Table 2 to chassis. Your readings should be within 20% of those given.

If the voltage at either terminal 9 or 11 is the same as terminal 12, the associated audio transformer has an open primary. Otherwise, connect a speaker and antenna to the set; you should be hearing stations. Happy listening!

THE LOUDSPEAKER

EDITED BY **FLOYD A. PAUL, W6THU**, 1545 RAYMOND, GLENDALE, CA 91201
PLEASE INCLUDE SASE FOR REPLY.

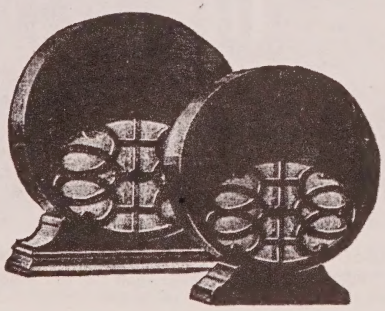
Teletone Horn Speakers

Teletone horn speakers came out relatively late in the horn speaker era. Ads appeared late in 1925 and carried on through 1926. *Radio Dealer* and *Radio News* magazines were among those that carried advertisements. The first model did not have a number assigned in the early ads, but was later labeled 62. It sold for $32.50 and was available in mahogany or walnut.

The company claimed that the speaker delivered pure tones because its construction was modeled on the human throat and mouth. According to the ads, it stood 13¼ inches high and weighed 5 pounds. The wood base was 8½ inches wide.

In 1926, the larger Model 60 appeared. Its base was 13 inches wide, Height was specified as 15 inches and weight at 6 pounds. It was available in the same two woods as the original model. According to the drawings in the ads, the Model 60 also had a larger bell diameter than the 62. The Model 60 was advertised at $32.50 while the original model 62 was now reduced to By the end of 1926 the models were still advertised as being different in height and weight, yet the bell diameters were now apparently the same. (Why have two assembly lines for slightly different horn sizes? Economically it made sense to have one mechanical design.) The author had the two horns in his collection; they measured 14¾ inches high and had the same diameter bells.

The original Teletone speaker had no model number. It was priced at $32.50 in this ad from The Radio Dealer *of December, 1925.*



Loudspeaker Using Violin Sound Principles

Radio Retailing, July, 1926

Teletone Radio speakers, manufactured by the Teletone Corporation of America, 449 West 42nd Street, New York City, are fashioned in the manner of a violin, utilizing a patented amplifying principal. An internal sound chamber of resonant spruce, or violin wood, is said to preserve true tone reproduction. Type 60 is manufactured with either an American black walnut or African mahogany and has an intended retail price of $32.50. Type 62 has an intended retail price of $22.50 and is obtainable in mahogany finish only.

By July, 1926, when this ad appeared in Radio Retailing, *the larger Model 60 had appeared. The original model was numbered 62 and reduced to $22.50.*

BY KOJI WATANABE

BUILDING AN "ALL-JAPANESE FIVE" SUPERHETERODYNE RECEIVER

In 1947, the G.H.Q. (Allied General Headquarters) ordered the Japanese government to organize a group of commercial broadcasting stations in Japan. Before then, the only source of broadcasting was NHK, which had been under control of the former Japanese Imperial government prior to and during World War II. The Allies considered that they would not be able to democratize Japanese society under such conditions.

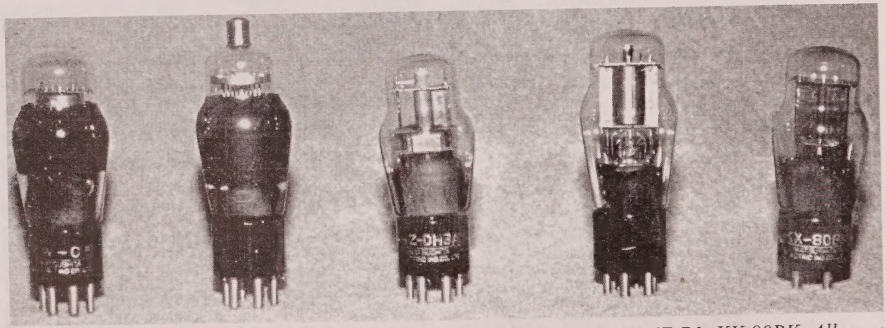
In the same year, the G.H.Q. prohibited the manufacture of regenerative receivers. Because many commercial stations were expected to start broadcasting in the near future, better selectivity was required. Until then, nearly all of the Japanese radio receivers were regenerative. A limited quantity of superheterodyne sets were produced before the war, but they were not widely used because of their high cost. Furthermore, the only broadcasting in Japan was done by NHK and, as in Nazi Germany, short wave reception was prohibited.

Obeying the G.H.Q.'s order, the tube manufacturers tried to make tubes for superheterodynes. But the tube facilities had been heavily damaged during the war and it was not possible to manufacture American GT tubes such as the 6SA7, 6SK7 etc. Instead, they decided to use old facilities to make a range of ST-bulb tubes suitable for use in superheterodynes.

The tubes were: 6W-C5 (converter), UZ-6D6 (i.f.), 6Z-DH3A(detector & audio), 6Z-P1 (output) and KX-80BK (rectifier). The 6W-C5 is electronically equivalent to American 6SA7 except for the socket and glass bulb styles and the fact that its heater current(0.35A) is a little larger than that of the 6SA7 (0.3A). The higher current design was said to have been required because of the unreliable voltage of the Japanese electricity supply and the lower performance of the available cathode material.

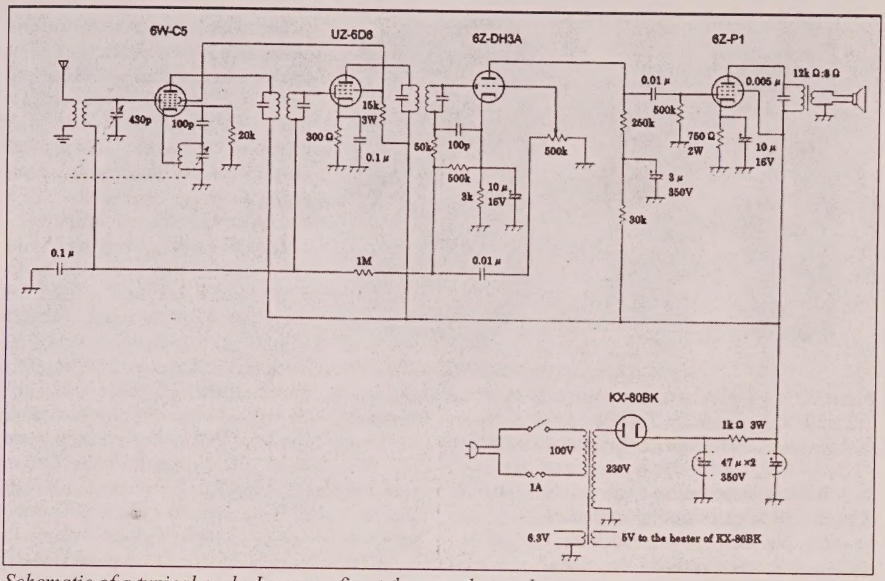
The UZ- 6D6 is an exact replica of American 6D6. The 6Z-P1 is somewhat similar to American 6G6-G. However, it produces less power, with more heater current and greater plate dissipation. The characteristics of these five tubes are shown in the accompanying table. Where more audio power was required, the UZ-42 power amplifier was used along with the KX-80 rectifier. These are not shown in the table, but are equivalent to the American 42 and 80.

I decided to build one of these typical Japan-

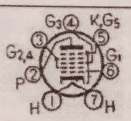
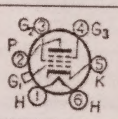
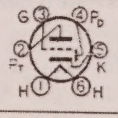
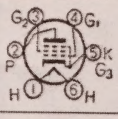
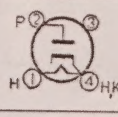


The tubes used in my five-tube set (l to r): 6W-C5, UZ-6D6, 6Z-DH3A, 6Z-P1, KX-80BK. All were made by Matsushita except the UZ-6D6, which was a "REX" (from the Toyo Dempa Co. of Kyoto—later a subsidiary of Matsushita).

44-2 UMEGAHARA-SAKAE, MAIHARA-CHO, SHIGA 521-0014, JAPAN



Schematic of a typical early Japanese five-tube superheterodyne.

type	typical operation	base connection
6W-C5	Ef=6.3V, If=0.35A, Ep=250V, Rg1=20kohm, Eg2=100V, Ip=3.5mA, Eg3=0, Ig1=0.5mA, gc=0.45mS	
UZ-6D6	Ef=6.3V, If=0.3A, Ep=250V, Eg1=-3V, Eg2=100V, Ip=8.2mA, Ig2=2.0mA, gm=1.6mS	
6Z-DH3A	Ef=6.3V, If=0.3A, Ep=250V, Eg1=-2V, Ip=1.1mA, r_p=91kohm, A=100	
6Z-P1	Ef=6.3V, If=0.35A, Ep=180V, Eg1=-10V, Eg2=180V, Ip=15mA, Ig2=2.5mA, RL=12kohm, Po=1.0W	
KX-80BK	Ef=5.0V, If=0.7A, Epmax=350V, I_{DC}=75mA	

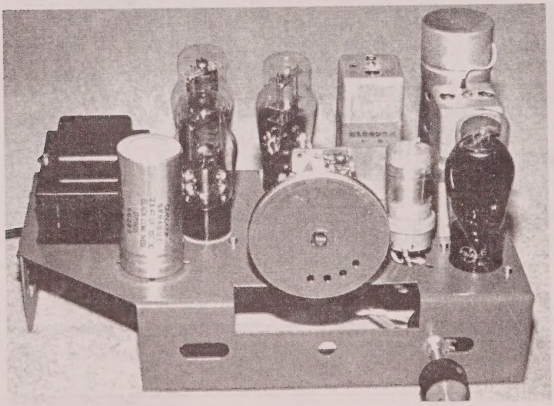
Characteristics of the "ST" tubes made in Japan for superheterodyne service.

E-MAIL: WATAN-KO@PK.HIGHWAY.NE.JP

Left: Though the KX-80BK technically has a UX 4-pin base, one pin was left off to save cost. Above: A UZ-6303 tube made by Toshiba. Its brand name "Matsuda" has the same derivation as the British "Mazda."

ese five-tube superheterodynes (see schematic). The design is quite similar to that of American circuity, but there are some differences. The oscillator coil has a cathode tap instead of a secondary winding. Also, the power supply uses full-wave rectification while most American sets with transformer supplies use half-wave rectification. The half-wave circuit allows the use of a less-expensive transformer. I don't know why American sets usually use oscillator coils with a secondary winding, but coils with a cathode tap are commonly used in Japanese sets, including later radios with miniature tubes.

I used an i.f. transformer with variable capacitors (though fixed capacitors are shown in the schematic). Transformers with variable caps were not widely used in Japan. Mine was made by Fukushima Denki, Osaka. The frequency written on the label is 463kHz. This frequency was common for sets made before 1950, including pre-war sets.



Koji's completed "All Japanese Five."

The tubes in my set were made by Matsushita Electric Industry, Co. of Osaka. This company was to become one of the major electronic companies in the world, and is now well known as "Panasonic." These tubes were also widely made by other companies such as Toshiba, NEC, TEN and various small manufacturers.

The radio worked very well and I very much enjoy listening to it. Later I substituted a UZ-6303 for the UZ-6D6. The 6303 was designed for television in 1941 by Toshiba and has very high conductance. Although some tubes for television were developed before the war and many studies were done, the outbreak of the war in China put an end to plans for television broadcasting. Towards the end of the war, I believe the tube was put to use in some Japanese radar sets.

In 1950 Nippon Electric Company (NEC), using Western Electric technology, began to manufacture miniature tubes. Other tube manufacturers soon followed suit. Thus, the GT tube era was bypassed in Japan. Though some GT types were made in Japan, they were intended primarily for export.

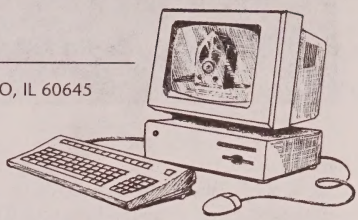
The typical line-up of the miniature tube radio is: 6BE6 (converter), 6BD6 (i.f.), 6AV6 (detector and audio), 6AR5 (output) and 5M-K9 (rectifier). As with the "ST" tube series, the rectifier was half-wave. In earlier sets, types 6AT6 and 6X4 were used instead of the 6AV6 and 5M-K9 respectively. The plates of the 6X4 were connected together for half-wave rectification.

A series of tubes for transformerless (called "AC-DC" in the U.S.) designs was also made. It included the 12BE6 (converter), 12BA6 (i.f.), 12AV6 (detector and audio), 35C5 (output, though later the 30A5 became popular), and 35W4 (rectifier). The reason why the heater voltage of the output tube was set at 30 or 35 volts was to make the heater total in the vicinity of 100 volts which is, of course, the standard Japanese supply voltage.

I'd like to extend special thanks to Mr. Takao Tsuda, who is a Japanese tube expert, for providing the chassis for my set as well as the UZ-6303 and other valuable components.

ON THE INTERNET

EDITED BY **CHUCK SCHWARK**, 7454 N. CAMPBELL AVE., CHICAGO, IL 60645
PLEASE INCLUDE SASE FOR REPLY. E-MAIL: caschwark@aol.com



Newsgroups and Forums

I've been snooping around the net a lot since the last issue, and the amount and scope of information and resources available to the radio collector, restorer and enthusiast really amazes me. The most obvious websites are the personal collections and professional museums and organizations that pop up during your searching. But what if your latest treasure, a Blatterfone model 34J-QZ, has a problem or a tube missing and you can't find a schematic or any information on this beauty? Or searching picture archives and online museums comes up short and your buddies never heard of it? There are sites on the Net where you can get help with your questions and that's what we'll cover here.

Newsgroups

Usenet Newsgroups (or just "newsgroups") is a global bulletin board structure within the World Wide Web, with tens of thousands of topics and hundreds of thousands of different conversations. There are newsgroups for every topic imaginable, from celebrity gossip to academic discussion, sports talk and personal ads, and of course our personal favorite, RADIOS! To see just how vast the topics and newsgroups are, browse the website at **http://tile.net/news/** — a database that contains every newsgroup available along with a short description of its content. It is well worth your time.

To participate in newsgroups, you use a program called a newsreader. Many times the newsreader is built into your browser, like Netscape, or is a feature of your commercial online service, like AOL. Newsreaders allow you to subscribe to newsgroups so you can read newsgroup articles, add, or post, your own, and reply to others. If you gain a good understanding of how newsgroups work and learn newsgroup etiquette, or "Netiquette," your experience will be much more rewarding.

Hierarchy of Newsgroup Naming

There are eight top level main categories in the newsgroup structure or hierarchy. These are:

- comp. (computer topics)
- misc. (miscellaneous)
- news. (newsgroup-related stuff)
- rec. (recreation)
- sci. (science)
- soc. (society)
- talk. (discussion)
- alt. (alternative).

Hierarchies are arranged so they get more specific as you work your way down. For example:

- rec.* (recreation groups — the "*" means "include everything under this")
- rec.collecting.* (recreation groups about collecting)
- rec.collecting.sport.* (recreation groups about sports collecting)
- rec.collecting.sport.football (a recreation group about sports collecting, specifically football) Be aware that rec.collecting.sport.* would also include sports collecting groups about baseball, hockey, etc. There are also special, regional, and local hierarchies that may not be available to all people. Also, your internet service provider, whether it is AOL or an independent company, determines which newsgroups are allowed on their systems to make available to their customers. Not all newsgroups can be accessed by everyone. Check with your service provider to determine the availability of a particular newsgroup.

FAQ (Frequently Asked Questions)

Most often, there is a list of answers to frequently asked questions and other useful newsgroup information for a newsgroup. (To pronounce "FAQ," spell it out or rhyme it with "back.") Always read a newsgroup's FAQ before you post. Newsgroups are like self-governing communities; there are no "newsgroup cops." Instead, posters regulate themselves to a greater or lesser degree. It's also a very good idea to see if you can read the groups' charter. A charter is an official description of what a newsgroup is all about, whether it's moderated, and what kinds of topics the group will, or will not discuss.

Below are some simple rules of newsgroup

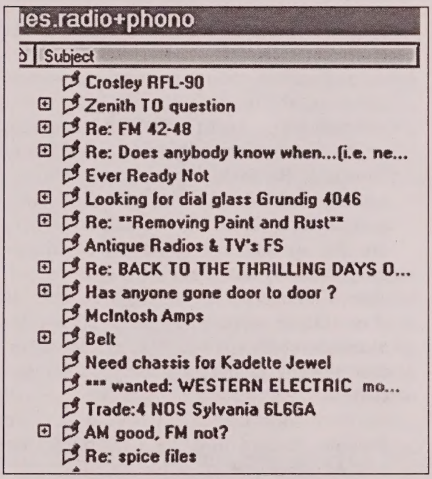
Upbeat cartoon logo greets visitors to Antique Radios Online.

etiquette to understand before you dive into a newsgroup. Think of newsgroup etiquette as a set of guidelines that will keep you from making mistakes and help you look and sound like a veteran newsgroup poster.

1. Start by "Lurking." Read the newsgroup without posting for a little while. It will give you the flavor or tone of the newsgroup.

2. Read the FAQ. Find and read the newsgroup's FAQ. It can answer questions you didn't even know you had, and it is the quickest way to learn what a particular newsgroup is all about.

3. Stay On-Topic. Know what is considered an appropriate topic and what is off-limits. Every newsgroup is a little different in what it talks about, and how it does the talking.



Typical "message threads" from the rec. antiques.radio+ phono newsgroup.

4. Don't Shout. TYPING IN ALL CAPS IS CONSIDERED SHOUTING AND BAD MANNERS. It's easier to read a mix of upper- and lower-case letters.

5. No Commercials. Be very hesitant about posting advertisements or commercial messages. This often makes people really mad and may go against the charter as well.

6. Don't "Spam." Spam is posting the same message to dozens of unrelated newsgroups. No matter how important you think your message may be, it's not worth it. Think about it—if everyone posted about every topic, no one would be able to find anything.

7. Be Original. Don't over quote in your replies. Copying a long post (more than 15-20 lines) just to add "I agree" or "me too" is considered bad form and forces people re-read or scroll through a post before they even see your reply or comments.

8. Follow the Golden Rule. Do unto others as you would have them do unto you. Remember, every expert was a "newbie" (newcomer) once.

Radio and Communications Newsgroups

The groups most likely to interest radio enthusiasts and collectors are all in the Recreation, or rec. level under radio. Here are some newsgroups with their full name and the official descriptions as provided by the group. The first eight are amateur radio related, so they fall under the rec.radio.amateur.* hierarchy level:

- rec.radio.amateur.antenna — Antennas: theory, techniques and construction.
- rec.radio.amateur.boatanchors — Vacuum tube-based amateur radio equipment.
- rec.radio.amateur.digital.misc — Packet radio and other digital radio modes.
- rec.radio.amateur.dx — Discussion, tips, notices and news for DXers.
- rec.radio.amateur.equipment — All about production amateur radio hardware.
- rec.radio.amateur.homebrew — Amateur radio construction and experimentation.
- rec.radio.amateur.misc — Amateur radio practices, contests, events, rules, etc.
- rec.radio.amateur.space — Amateur radio transmissions through space.

The next newsgroups are radio related, but are not specifically geared towards Ham radio:

- rec.radio.swap — Offers to trade and swap radio equipment.
- rec.radio.scanner — "Utility" broadcasting traffic above 30 MHz.
- rec.radio.shortwave — Shortwave radio enthusiasts.
- rec.radio.broadcasting — Local area broadcast radio topics.
- rec.antiques.radio+phono — Audio devices and materials of yesteryear.

The last one above is probably the most well known newsgroup in our hobby because it's the

ROSS A. SMITH

TCA and the antique-radio world have lost Ross Smith, one of those multi-contributing individuals whose influence is quiet but substantial.

Ross' career was as an engineer with essentially one employer, Chicago Telephone Supply (later CTS Corp.) in Elkhart, Indiana. After retiring he served as curator of the CTS Museum. He was an early, strong supporter of the Indiana Historical Radio Society and its radio-display efforts, culminating in a museum at Ligonier.

Beyond IHRS, his "Transistor Topics" articles in the *ARCA Gazette* were the first coverage of this area in the collector press - his pioneering story on the Regency TR-1 in 1985 was two years ahead of other journals. As a career-long IRE/IEEE member, he contributed heavily to the TR-1 article in the *IEEE Spectrum* (Dec. 1985). His transistor-radio articles continued in the AWA *Old Timer's Bulletin* after the demise of the *Gazette*. His articles on radio-restoration techiques appeared in AWA and other bulletins.

Smith was an enthusiastic participant in equipment-display contests, and tended to win ribbons with restoration quality and significance of the gear rather than elaboration of display. He received the 1985 AWA Elle Craftsman award for his restoration results. In 1940 he had built an iconoscope TV camera and monitor from an article in *QST*; he displayed them at Rochester 50+ years later!

Ross was a long-term tube collector, a member of the old AWA Tube Group and later TCA. (Witness the "wedding-cake" tube display on the cover of last October's *Tube Collector*.) He was one of the first individuals to recognize the historic value of, say, assembling a set of the "original nine" RCA metal tubes.

Our sympathies go to Smith's widow Wava and son Victor. - LAS

group for antique radios and phonos. Even though it's under the "antiques" level, you couldn't tell this just from looking at its description!

There are many more professional and commercial groups that are radio and broadcasting related and could interest you as well. Have a look, you'll be surprised!

Discussion Forums

There are another avenues for making message contacts on a more personal or one-to-one level. Discussion forums (sometimes called chats) that are similar to the post and reply style of a public newsgroup, but are most always moderated and usually do not contain any advertising or commercial content. So for us radio fans, here are what I believe to be three of the best out there. There is plenty of daily message activity on all these forums. Experts and novices alike exchange information, tips and troubleshooting knowledge on any radio topic.

Detail from home page for the very comprehensive Xtal Set Society web site.

• Nostalgia Air

http://www.nostalgiaair.org/NostalgiaAir/index.htm

Hosted by Rich Lancaster, Nostalgia Air is dedicated to the preservation, conservation and dissemination of antique and vintage electronics technical information. This is a personal, private venture with no commercial content. The site is maintained as a commercial free zone, except for the sole references on this page to those that support the site.

The extensive amount of technical information includes: Riders Online, Schematics, Online Manuals, Online Tube Substitutions, Tips and Training, Dial Lamp Characteristics, Parts Color Code References, and three Forums: *Technical Discussion Forum, What's New Forum, Comments and Suggestions Forum*

• Antique Radios Online

http://www.antiqueradios.com/cgi-bin/forums/

This well-visited website hosted by Alan Voorhees boasts the largest listing of radio collecting related links of the web for any and all resources. The other features of this website are: Articles on radio topics, Listen to vintage radio programs in streaming RealAudio. List of radio clubs around the world. Largest listing of free radio ads on the internet. Join in live chat sessions Wednesday nights. There are four forums in which to ask questions about radios, radio repair, and restoration:

Antique Radio Discussions (Share collecting tips/ideas, discuss antique radios, phonos and related items.); *Cabinet Restoration* (Questions, tips and advice for radio cabinet restoration, repair and refinishing.); *Electrical/Mechanical Restoration* (Questions and answers about the inner workings of radios/phonos.); *General Announcements* (Made a change to your radio website? Have information on an upcoming radio event? Discussions that don't fit into the other categories go here.)

• The Xtal Set Society

http://www.midnightscience.com

The Society, founded in 1991, is... "dedicated to once again building and experimenting with radio electronics. Our newsletters are packed full of projects and information about Crystal Radios, mostly dealing with design and electronics issues. Each issue contains lead articles—and often, a building project—a "tidbits" section including hard to find information, membership correspondence, and a list of vendors or references. Our lead articles are written by members of the Society. Sometimes we reprint a hard to find article from the 1920s or '30s. Members are encouraged to send projects and information to the Society and to correspond with each other."

There is also a message board feature on this site called *Rap'n Tap, the Online XSS Forum.* Have a basic question about how crystal radios work? Want to discuss advanced radio theory? Need help building your radio kit or preparing a science fair project? This is the place. The discussion group is open to everyone with an interest in crystal radios and related radio topics. It is not moderated, so participants are asked to keep their comments courteous and to the point. Be sure to check out the FAQ for general information and answers to common questions

BY ART BILSKI, DIRECTOR OF PUBLIC RELATIONS,
ANTIQUE RADIO CLUB OF ILLINOIS

DR. RALPH "DOC" MUCHOW 1917-2000: A FRIEND GONE BUT NOT FORGOTTEN

As soon as news of Dr. Ralph Muchow's death last March became public, I contacted The Antique Radio Club of Illinois and asked if they could supply us with an article touching on both the man and his famed collection. Art Bilski, Director of Public Relations for ARCI, took on the job and promptly supplied us with this very moving and personal account. He also provided the photos for the article and arranged for us to use the eye-catching panoramic view of the museum originally photographed for Smithsonian Magazine.

Long-time AWA members remember Dr. Muchow's impressive Old Equipment Contest entries at our annual conference, and AWA records show that in 1983 he won the Thompson "Best of Show" award. He also received the Houck Preservation Award for 1980. It should be noted that the Doctor was a Fellow of the prestigious Radio Club of America.

I can't resist sharing a personal memory of Dr. Muchow. In the late 1960s, I moved to Chicago with a truckload of possessions that had been in storage for many years. Included was a large collection of battery sets and related artifacts that I decided should now be thinned out. I put an ad in the paper, and among the prospective buyers was a lean scholarly-looking man who seemed remarkably knowledgeable about my wares.

I won't say he was exactly snobbish about my stuff—but he let me know that he already had at least one of everything I offered. He did purchase a few things "to use as trading pieces," he said. Among the items was my extra Dictograph horn. The years had not been kind to its pot-metal base—which was full of cracks and other distressing faults.

I was quite embarrassed about even showing it, and suggested it might take a patternmaker to mold and cast a new base. "....or a dentist," he replied in a tone that assured me that the horn would be looking pristine in short order. I've thought about that conversation off and on over the years—imagining the doctor at work on the base in his office, dental tools in hand, efficiently filling cavities with porcelain or amalgam.

—MFE

In downtown Elgin, Illinois, stands an unpretentious looking two-story office building. The kind of building you expect to visit for an appointment with your doctor or dentist. But for many years, only one dentist operated out of the building: Doctor Ralph Muchow. The remainder of the building—24 rooms in all—was filled with Doc Muchow's incredible 3400-piece radio collection, possibly the world's biggest.

It all started in the 1920s when the Doc, fascinated by radio as a youngster, began building crystal sets. His passion for radio led him to move to progressively more complicated tube sets as the technology advanced. He kept pace with the art and science of radio right up through the sophisticated multi-tube receivers of the 1940s. No repair or restoration job on a pre-World War II radio ever stumped him, and this knowledge and ability became extremely useful as he built his private collection.

Dr. Muchow graduated from Northwestern University Dental School in 1939. He served in the U.S. Army as head of the dental survey office at Camp Ellis in Illinois (1943) and transferred to Percy Jones Hospital in Battle Creek Michigan the following year.

In 1946 he established roots in the town of Elgin, Illinois, practicing dentistry there until his retirement in 1999.

Though most serious radio collectors know of Dr. Muchow's accomplishments in our hobby, it is not as generally known that in the 1930s he was a nationally-ranked ping-pong player. In fact, he was the top-ranked table tennis player in Illinois, and second nationally, from 1937 to 1939. In 1988 he was inducted into the city of

208 GREEN MOUNTAIN DR., BOLINGBROOK, IL 60440

The doctor and his museum pose for a Smithsonian feature article. (From Smithsonian Magazine *for February, 1997. Photo by Henry Groskinsky.)*

Elgin's Sports Hall of Fame because of these distinctions.

Despite his early attraction to radio, it wasn't until 1968 that he began to collect seriously. Among the many stories he shared with us about his collection was one about how he got started. One day in the late 1960s, as he was walking past an Elgin antique store, he spotted two old radios in the window. The proprietor had no information about the sets but did say that they were not working. After negotiating for a bit, Doc bought both radios for $35. Within a few days both radios were again working. One of them, a beautiful Atwater Kent Breadboard Model 10 still in the collection, is probably worth more than $1,000 today.

As with many dentists, the Doctor would close his office every Wednesday. But instead of playing golf, he would go hunting for radios. As the Wednesdays rolled on, the collection grew… and grew! Originally stored in the basement of his home, it quickly outgrew the limited space. And as with this author's collection, the radios began showing up in every room of the house.

Finally Carole, Doctor Muchow's beloved wife, put her foot down and the radios moved to the office building where Doc had his practice. Slowly and surely, as tenants moved out of the building, the collection continued to expand. Today it fills the entire building.

Despite his 30-year immersion in the hobby and his acquisition of some of the rarest radios in the world, Doctor Muchow never lost that radio interest and "fever" that he had as a young boy. I was attending a bi-monthly meeting of the Antique Radio Club of Illinois last year and Doc, as always, was in attendance. He had in his hand one of those new transistor radios powered by a hand-cranked gyro—just given to him by his son Steve. The sparkle in his eye and the joy in his voice of course reflected his pleasure at receiving a sensitive gift from his son. But I suspect it

(continued on page 46)

Dr. Muchow shows off his 1930s Atwater Kent "Fontana."

BY FIN STEWART

EARLY AUSTRALIAN VALVES

*This article by prominent Australian tube collector Fin Stewart is a portion of "The Valve Box Part 16: Australian Valves, Valve Collecting and Repair," which originally appeared in H.R.S.A.** Radio Waves *for April, 1999.*

Amalgamated Wireless, Philips Electrical Industries and Standard Telephones and Cables Ltd each had valve-making factories operating in Australia over the years. The first to start production, and the most widely known, was Amalgamated Wireless or AWA. The famous Expanse-B valve, made at the Knox St, Sydney plant, is by far the most sought-after historical Australian valve and several exist in collections in Australia. About five are in foreign hands and most of these are in the United States; however, one of the leading radio historians in Vienna has one.

At least ten thousand of the valves were made and each one had a serial number stamped into the plate. Two distinct end caps were used on the valves and the size difference can be seen easily in Photo 1. Ebonite caps were used on the centre, older valve, while Ebonite caps were used on the later version. It is not known when this changeover occurred.

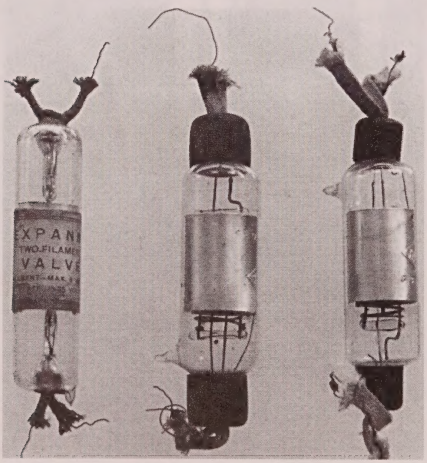


Photo 1. From left: Expanse Valve, Expanse B valve with Ebonite caps, Expanse B valve with Bakelite caps.

The valve at left is older still and is a de Forest or Cunningham Audiotron type, but with a paper label on it saying it is an Expanse Two Filament Valve. It is most likely an American valve imported by AWA with their label on it. These are much rarer and only one other sample is known to exist with the label intact. Production of the Expanse-B valve began in 1920 and continued until some time in 1922.

In 1923, AWA expanded their valve-making interests to include several other valves such as the 99V, 101A, 100, 33 and 55. These were all single ended and some are shown in Photos 2 and 3. The 99V, second from left in Photo 3, has an American Shaw-type base. These were made about 1926 and the series also included a 109X. Here, I appeal to readers, through Brother Pat Dowd (address at bottom of title page), to let me know if they happen to have any AWA type 55 valves (they are similar to the type l00 at left in Photo 2) or any 101A types.

In 1933, AWA opened a valve factory at Ashfield in Sydney and the first valve made there was the type 80 rectifier. The sample I have in my collection has the words "Made in Australia by A.W. Valve Co Ltd" hot-branded on the base, rather than "Radiotron—Made in Australia," and this would have to be a very early production type. Other valves to be made in 1933 could well also have this branding on them but I have never seen any. They would now be very rare.

AWA went on to make a few direct equivalents of British valves, such as the DE7 tetrode and the HL210. I recently acquired an Army AR4 triode which is similar to a 30, but with English 4-pin base. However, most of the valves made by the company were American types.

Late in 1935, work commenced on a low power transmitting/RF power amplifier pentode. This was called the 6P6 and is actually a 42 with

**Historical Radio Society of Australia*

C/O BRO. PATRICK DOWD, F.S.C., W2GK, 4415 POST RD., THE BRONX, NY 10471-3499

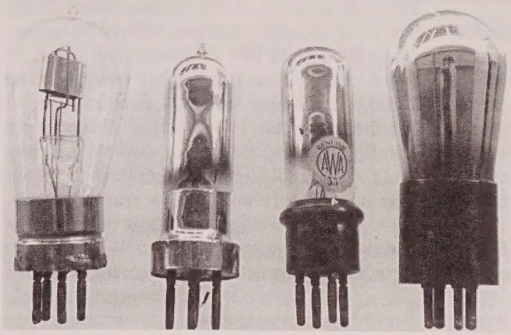


Photo 2. From left: AWA 100, AWA 33—two versions, AWA 101X.

the top cap as plate connection. These were made for a few years by the company but are also rare today.

Two other singularly Australian valves were made by AWA and are the AVll rectifier for radar use and the 6AR7GT. The latter valve was a high-gain duodiode pentode. None of these three valves was made by any other company.

It is most unfortunate that when AWA was gearing up for colour television manufacture at their Rydalmere plant in the early seventies, two truckloads of experimental and historical valves were dumped. Even Phillip Geeves, the AWA archivist, was not informed of their disposal and they were lost forever. In the mid-thirties AWA. made valves for the British General Electric Co Ltd with the brand name of Osram and they may also have made the odd Ken-Rad valves which turn up occasionally, hot branded "Made in Australia."

Philips Electrical Industries made valves at a factory at Hendon in South Australia from 1936 but most of these were American equivalents. However, some Dutch types were made at the factory and the most common of these appears to have been the EL3N and EL3NG. The EL3N had a tubular bulb with the side contact 'P' base as well as an octal base. Transmitting valves from the 807 to the water-cooled TAW12/1S were also made as was the 367 rectifier. When the factory finally closed around 1989-1990 all records and sample valves were disposed of to the tip.

It is not known just what Dutch-type valves were made at the factory but perhaps one of our members has a list. Any information would be greatly appreciated. Mullard valves of American types were also made at the factory but no other information is available on whether any other brand names such as Condor—the Philips subsidiary—were made there.

STC started a valve factory at Waterloo in Sydney in 1939, with a range of telephone repeater types. These were in two styles: Western Electric SY4101D, SY4102D and SY4104D and the British types SY4019A, SY4020A, SY 4021A and SY 4022A. The SY prefix standing for Sydney.

STC made other Western Electric equivalents, such as the 242A and 281C. But, once again, when production ceased, records were destroyed. However, I was lucky enough to get several dozen valves from the factory before they were also disposed of. This was quite a cross-section of types that were made there and many would be uncommon today. Most of the valves made by STC were either for telephone repeater work or for industrial use.

One Australian valve which should be mentioned is the Garrard and Ratcliff triode made in 1923. This valve was made at the southern end of the Sydney city area and a reasonable quantity must have been made as four variations of the valve are still known to exist. Original G & R valves had a brass shelled base, tubular bulb and a special patented glass press for extra strength. A couple of years ago on the Central Coast a pair of these valves turned up which have nickel plated brass bases and short bulbs, rather than a longer bulb and unplated base. It is also quite probable that the company made valves with

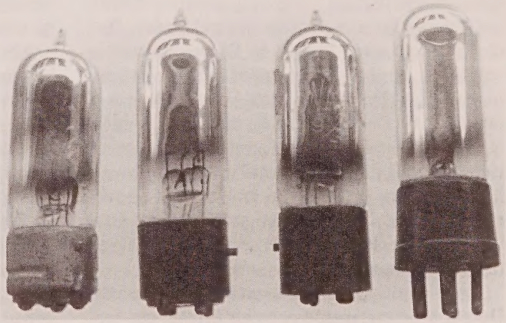


Photo 3. AWA 99V and 99X valves.

Bakelite bases as two of these also exist.

During World War One, it was popular for electric lamps to be repaired and this practice followed on with valves. The Vacuum Tube Repair Co. advertised that it could repair filaments and other elements of Marconi, de Forest, Moorhead and Western Electric valves at its plant in Oakland, California. The company also claimed that the repaired valves would operate better than when new.

A few other companies in the United States and a couple in Europe also offered this service but in the long run, it was uneconomical. In the late twenties some concerns offered to rejuvenate valves with low emissions and these, to some extent, were successful. The magazine *Radio* of December 1924 had an article entitled 'On the trail of the Tube Sharks.' These people usually operated from premises where they could move quickly when they had worn out their fake practice and the law was closing in. Some of these used paper labels on the valve glass stating what they had actually done to the valve. In most cases these were not legitimate.

MUCHOW, *continued from page 43*

A small section of the museum's Atwater Kent display.

was the same sparkle that was present more than 70 years ago when he built his first crystal radio.

As the years passed, Doctor Muchow met and kept in contact with fellow collectors throughout the world. He became one of the earliest members of the Antique Radio Club of Illinois. Once the club was formed it was only a matter of time until the radio swap meets began. Today, Radiofest (held each August in Elgin, Illinois) is one of the largest gatherings of radio collectors in the United States. And each August, come rain or shine, the Doctor would be out there, looking at all the radios, swapping stories, and meeting new and old friends. An award in Dr. Muchow's honor is given each year to the "Best of Show" radio entered in the annual contest. The Doc would personally present these awards adding to their significance.

Each year, in conjunction with Radiofest, Doctor Muchow would open his private not-for-profit museum for viewing. This event became a family affair with immediate family and grandchildren all participating in the tour. Just this last year I escorted a news reporter over to the museum for an interview. We were early so we walked around, on our own, from room to room. Although I had been there many times before, the impact of so many working radios in one place was breathtaking.

Immediately after I introduced the reporter to Dr. Muchow, they formed a bond like that between teacher and student. Doc could talk for hours about radios to anyone who would listen and he never tired of telling the stories about each and every radio. His mind was sharp and I suspect he could remember where each radio in the collection came from.

Doctor Ralph Muchow is deservedly recognized as one of the founding fathers of radio collecting and he will forever be part of the Antique Radio Club of Illinois. I doubt that anyone will ever be able to duplicate the collection either in terms of numbers or depth. Neither will anyone be able to duplicate the man.

This year, during Radiofest, the museum will be shuttered and dark. Its future remains unknown as the family considers all possible options. But no matter where the Doctor is, I am sure that he is still surrounded by the radios of yesteryear—perhaps listening to The Shadow, Jack Armstrong, and other radio shows of his childhood.

Our deepest sympathies are extended to the family. The Doctor may be gone but he will never be forgotten. To those of us who are avid radio collectors, he represented the dream that we all cherish. But Dr. Ralph Muchow was more than just a radio collector and family man. He lived a full and active life and will forever be missed.

BY WILLIAM N. COFFEY, W2PIX

MEMORIES OF A VOA VISIT

In May, 1990, while travelling south on route 17 just east of Greenville, NC, I noticed a huge antenna farm to the west. A short distance down the highway a sign labeled "VOA-Site B" pointed to a side road. After a 10 mile drive I arrived at a fenced-in area, complete with guard house and a closed gate. Visiting hours had finished at 12 noon and it was now 2 p.m. A sign on the guard house indicated that inquiries could be made by using the telephone alongside the sign. A voice responded wanting to know if I had made arrangements for an after hours visit. I said "no," but hoped I hadn't make the long trip for nothing.

I was then referred to the shift supervisor, who said it would be ok, but no cameras would be permitted inside. At that moment the remotely controlled gates opened and I walked over to the attractive tan brick building, about 150 by 200 feet in size, and climbed up a dozen wide concrete steps to pass through a double glass door to meet Howard, the shift supervisor.

We passed through a large-windowed, empty reception room containing chairs, sofa, coffee table, and decorative plants, and into a high bay area containing the 18 or so transmitters, each in its own walled-off area. There were 6 transmitters at 5OOkW output power, 6 transmitters at 250kW, and 6 transmitters at 50kW. The manufacturers included AEG (Allgemeine Electrische Gesellshaft) of Germany, Brown-Boveri of Switzerland, TMC (Technical Material Corp) of the USA, and General Electric Co. of the USA.

Howard took me behind the first one, a 250kW unit, to show me the repairs being made to the final stage roller inductor tank coil. A poor contact between the coil conductor and the roller had caused arcing which burned a hole in the 1 inch diameter copper conductor, releasing cooling water all over the place. This coil was about 2 feet in diameter and 2½ feet tall.

Next we visited the 500kW AEG transmitter, which looked brand new to me. Painted on each panel of the several cabinet racks there was a block diagram of the circuitry behind the panel. A quick glance at a cluster of panel meters indicated a final plate voltage of 10kv and a final plate current of 60 amps—a DC power input of 600kW. The r.f. power output meter was sitting at an even 500kW.The plate circuit efficiency was therefore 83%. A crossed needle v.s.w.r. meter registered 1.57.

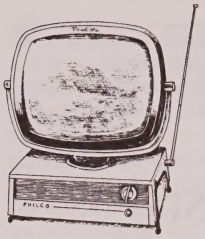
This complex not only provides foreign broadcasting service, but also is used to communicate with our foreign embassies. Amplitude modulation and single side-band modulation is used for voice transmissions, frequency shift or phase shift modulation is used for radio teletype. Embassy traffic is usually encoded for secrecy. As a rule AM and SSB signals are modulated at low power levels and brought up to final output power with linear amplifiers. A new modulation technique (new to me at least) was employed in the AEG 500kW unit. Howard called it "step modulation" The final class "C" amplifier is plate modulated directly from a multi-voltage power supply, DC coupled via switching diodes to the plate voltage supply bus of the final amplifier. (Switching diodes is Howard's term—probably silicon controlled rectifiers or triacs). This process generates a step-wise approximation to the waveform of the modulating signal. The multi-voltage power supply alone occupied a space estimated at 15 by 20 feet high.

There were two antenna sites, each containing many wire antennas supported by countless steel towers that seemed hundreds of feet tall. The antennas could have been Sterba curtains, certainly some kind of phased arrays to produce directivity and gain.

The antenna sites and transmitter building were laid out in a "T" formation, the two antenna groups at the ends of the horizontal bar, the transmitter building at the bottom end of the vertical bar, and an antenna switching center at the intersection of the two bars. Both the horizontal and vertical bars thus delineate the paths of con-

(continued on page 49)

9 CORTLAND DR., RD1, BALLSTON LAKE, NY 12019-2645



TELEVISION

EDITED BY **RICHARD BREWSTER**, C/O MERCY SHIPS, M/V ANASTASIS, BOX 2020, LINDALE, TX 75771. *PLEASE INCLUDE SASE FOR REPLY.*

Operating the TRK-12

Reader contributions to this column are always invited. I encourage anyone with a good ideas for an article on some aspect of TV history to contact me. I'll be happy to work with you to edit your manuscript if needed.—RB

In the last issue, we ran a picture of RCA's pre-war mirror-in-the-lid Model TRK-12. For all you TV enthusiasts out there who either have the good fortune to own a restored RCA TRK-12 (or -120), or who are just interested in learning as much as you can about sets of this era, here are the official RCA operating instructions for the receiver:

Detail from picture printed in last issue's column highlights the TRK12's handsome appearance and finely-crafted cabinet.

Receiving the Picture

To obtain picture reception, open the lid of the cabinet and:

1. Turn the Fidelity-Selector Control on the Radio panel to "Television," fully clockwise, and the Range Selector to "A."

2. Turn the Power-Volume Control on the Radio panel clockwise and advance about halfway.

3. Set the Station Selector on the Television panel to the desired television station 1-2-3-4-or 5.

4. Turn the Contrast Control fully counterclockwise and then turn the Brightness Control slowly until illumination of the screen almost disappears. Advance the Contrast Control until the picture appears at its best as viewed in the mirror on the lid. The Contrast Control turned too far clockwise causes blurring. Make the final adjustment for best picture by adjusting both Contrast and Brightness controls. A little practice at operating these controls will soon enable you to obtain the best picture. Incorrect setting has effects somewhat similar to under and over exposure on photographic prints.

5. If the picture is not steady, the "Hold" controls will require slight readjustment. If the picture is moving sideways the Horizontal Hold (inner "I" section of the knob) requires readjustment. If the picture is moving up or down or is off position vertically, the outer ring "O" of the knob, Vertical Hold Control, requires readjustment.

6. Adjust the Volume Control and the Tone Control (Fidelity- Selector knob) for best sound reception.

7. If an interfering ripple is observed in the picture, adjustment of the Fine Tuning knob, pressing in while turning, may reduce or eliminate the distortion. If not call your dealer.

8. If the picture appears out of focus, carefully adjusting the Focusing Control on the side of the cabinet with a screwdriver will remedy the condition. It not call your dealer.

As long as the Television Receiver is not moved in any way, only an occasional setting of the other controls will be required. Call your dealer at any time resetting of these controls becomes necessary. A spot in the center and also a slight discoloration of the television screen may gradually appear as the Kinescope ages. This is normal and does not interfere with good picture reproduction.

The installation technician, when making the installation, will be pleased to demonstrate and explain fully the use of all the different controls.

Meissner Memories

The following is an excerpt from a fascinating and informative letter written by Mr. Ross Smith in reference to the May 1999 issue of the *OTB*:

I was surprised and delighted when I turned to page 36 of the current OTB *and found Dr. Holden's article on the 5" Meissner 1939 TV set. I graduated from Tri-State University in January of 1940 and my first application for a job was at Meissner Manufacturing at Mt. Carmel, Illinois. Mr. Robert Thompson, who had designed the Meissner 5" TV, invited me to work with him for two weeks while waiting for a possible opening with Meissner. They were shipping a few of the kits at that time, but had received very few orders and dropped the project with the coming of World War II.*

I helped build a TV signal generator for Mr. Thompson's laboratory while I was there. He had erected a tuned "V" antenna pointed toward New York City, but was not able to pick up a TV signal. The job at Meissner did not materialize and I went on to apply for work at several eastern companies including RCA, Philco, and Bendix. However, I wound up with CTS corporation in Elkhart, Indiana. I am still with CTS as Director of the CTS-Turner Museum.

After the war, Mr. Thompson started his own company in Oak Park, Illinois producing and selling 10" TV kits with tuners and IF strips of his own manufacture. After the "kit craze" cooled down, he became chief television engineer at Majestic in the Chicago area. I lost track of him after that.

Note: There is an article on the Meissner 5" TV by Mr. Thompson in the May 1939 issue of *Radio News*.

VOA, *continued from page 47*

necting open-wire transmission lines. Only very short runs of coaxial cable were used—these between the output of the transmitter and an impedance matching transformer or balun inside the transmitter building,

The switching center resembled a large switchyard you might find next to a large power plant similar to those at Niagara Falls. Its function is to connect the lines from the transmitter building to either of the two antenna sites. Large DPDT pneumatically-operated and computer-controlled switches perform the transfer.

All transmission lines outside are open wire. The 50kW line looked like ½-inch tubing on 12 inch centers. All other lines had four conductors arranged in a square cross section much like you see on a 500kV power transmission line. All but one of these rf lines were enclosed in separate metal ducts, around 2 feet by 2 feet in cross section. The metal poles that supported the one line not ducted, had red stripes painted on it to warn personnel that the poles were "rf hot."

Finally we came to a centrally located control center, mounted on a floored platform a few steps above the building floor. A long console with a panel containing audio feed mixing and switching controls, illuminated switches, panel meters, oscilloscope monitors, computer controls, etc. were operated by two to three men. I was told that many functions such as transmitter selection, frequency of operation, audio feed source, antenna selection, were programmed by computer.

Three engineers plus the shift supervisor constituted the operations team when I was there. Operations were continuous, 24 hours per day. It was no surprise to learn that many of the control engineers were also amateur radio operators. Frequencies used span 5.5 to 25MHz. Other Voice of America transmitting sites are located at Marathon, Florida; Bexley, Ohio; and Delano, California. Receiving sites for each transmitting site are located 15 to 20 miles away.

BREADBOARDING

EDITED BY **RICHARD A. PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
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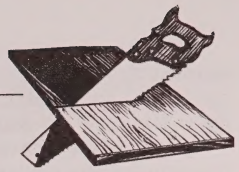


Bring Historical Circuits to Life On Your Workbench!

Regenerative Detectors—Another Version

Last time we breadboarded a modern version of Armstrong's regenerative receiver circuit. It used a "modern" triode and a varicoupler-style tickler coil. This time we'll take a look at other means of controlling regeneration—varying the amount of positive feedback from the plate circuit back to the grid tank.

Figure 1 is repeated from the last column; and Figure 2 shows two other methods for keeping the tube just below oscillation, but still amplifying the incoming signal far beyond the factor available from the tube by itself. Gone is the variable tickler coil. Now the feedback coil is fixed in place, making for better mechanical stability. Instead there's a variable capacitor from plate to ground.

This control changes the proportions of RF plate signal going directly to ground and through the tickler. Sometimes called a "throttle capacitor," it varies the amount of regeneration. It can be smoother in its effect than moving a rotating coil. Also, we can now use plug-in coils in the receiver, which is kind of impractical with variocouplers.

The photos show the breadboard after making the change to four-pin plug-in coils. The layout is still pretty sloppy: not as compact I'd like—especially for reception on higher frequencies. However, with the coil shown, I got stable operation almost to 10 MHz.

You'll note that I have followed expert guidance in adding a second tuning capacitor in parallel with the 22-plate cap that I used alone last time. The smaller tuning cap (in the middle of the panel) is used for fine tuning. We call it a "bandspread" control, because it acts to make closely-spaced stations appear farther apart. There's an antenna trimmer cap centered at the top of the panel.

Another means of controlling regeneration lies in the use of a 50K Ohm pot in the B+ lead and external to the set itself. This lets us change the plate voltage on the tube, and in my breadboard it turns out to be a pretty good way to peak up the circuit. Actual plate voltage, just below oscillation, is between roughly 22 and 35 volts.

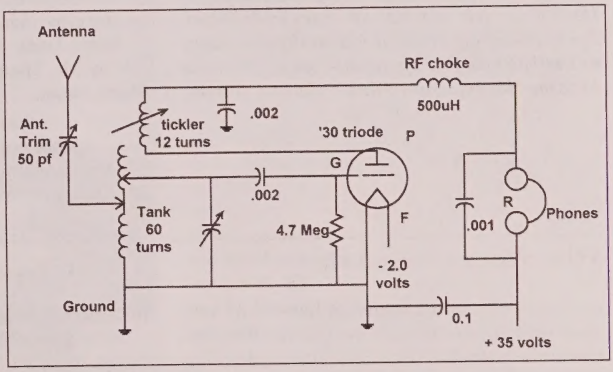


Fig. 1. The regenerative circuit that we explored in the last issue.

It depends on where you are in the receiver's tuning range.

How does the set perform, you ask? I fired it up at night and tried two antennas: one 240-foot long wire out to a 90 foot tree, and another 35-foot wire into another tree right outside my shop. Lots of SW broadcast stations from the Northern hemisphere throughout the 31 Meter band (9500-9900 KHz) and more stations down in the 49 Meter band (5800-6200 KHz). I picked up Switzerland and France, plus several Spanish language stations, but couldn't quite tune up to WWV on 10 MHz. On standard broadcast, using the longer wire, the first two stations I logged were CKLW and WGY— a couple of powerhouses on 800 and 810 KHz, respectively. Took me back 50 years!

Now, just as in most regenerative circuits, all four of the controls, including the antenna trim capacitor, interact with each other. I found the best way to operate is to set the antenna control as open as possible, so as not to add a lot of the antenna's capacitance to the grid tank, then with the throttle cap set about halfway, advance the plate voltage to a value just below oscillation and tune around for a station. I found the throttle capacitor could separate stations, especially up in the SW bands. It was annoying, too, that "hand capacity" came into play when I touched the antenna trimmer knob. A way to get around that is to mount the capacitor 'way back of the panel and use an insulated shaft extension to get through the panel. But I know where this receiver is headed: we're going to look at using a next-generation tube, a screen-grid detector. That should give us more gain, and we may not have to bother with an antenna trimmer.

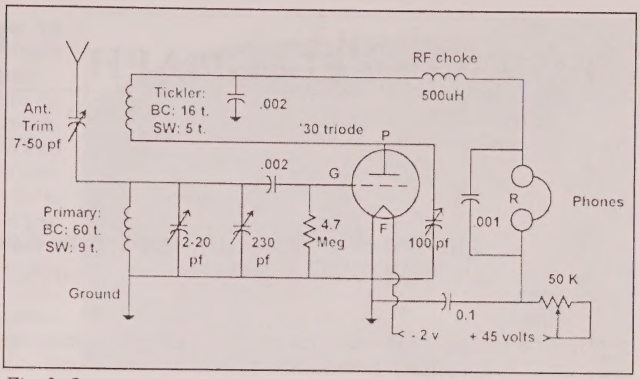


Fig. 2. Our current circuit, incorporating a fixed tickler and a throttle capacitor.

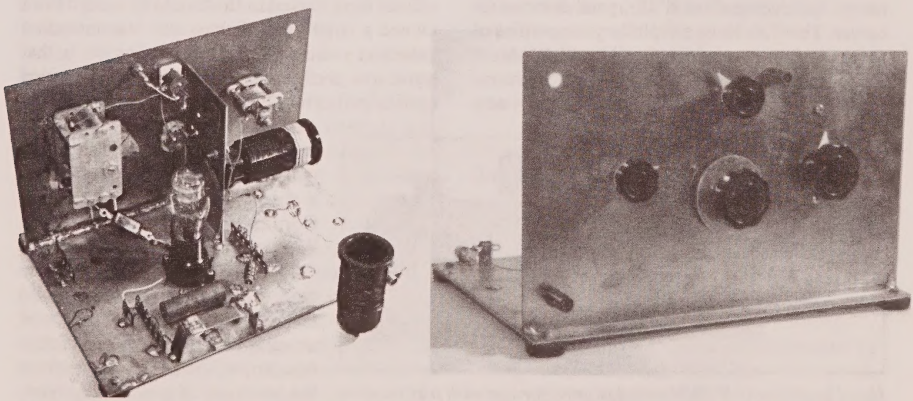
Want to learn more? Check out "Rock" Rockey's book on these receivers (reference 1). He even gets into transistors!

Steve Dow of Powell River, BC, Canada wrote to offer an explanation of why I got that squeal in my 'phones when I used a 0.02 bypass cap in the previous circuit: "A probable reason is that you introduced a new parallel tuned circuit, the phone inductance and the 0.02. The inductance of a 2000 ohm phone is about 0.5 Henry. With that value capacitor the resonant frequency is about 1.6 kHz" To test his idea, I substituted a 2000 ohm resistor for the 'phones, watched with my 'scope, and the squeal disappeared.

Steve also pointed out that my big tank coil was "sitting above a nice virtual low resistance shorted turn robbing some Q." Boy, I had overlooked that — my copperclad chassis, right below the tank, sure does constitute a coupled shorted turn, lowering both the coil inductance and its effective Q. I've heard of stray capacitance — would this be an example of stray inductance?

REFERENCE

Secrets of Homebuilt Regenerative Receivers by C.F. "Rock" Rockey, Lindsay Publications, Inc. Bradley. Il. Rev. 1997



The breadboarded receiver in its new configuration, which makes possible the use of plug-in coils.

KEY AND TELEGRAPH

EDITED BY **ROGER W. REINKE**, 5301 NEVILLE CT., ALEXANDRIA, VA 22310-1113
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The Wireless Specialty Apparatus Company

By Russell Kleinman, WA5Y, 25 Oxbow Rd., Silver City, NM 88061

The "spark era" of wireless telegraphy lasted roughly from 1895 to 1924, the span of years between Marconi's early success and the enactment of legislation curtailing the use of spark transmission. The Wireless Specialty Apparatus Company (WSACo.) was one of the most successful designers and manufacturers of receivers and keys during the midportion of the spark years.

The origins of WSACo. date to 1906, with the partnership formed by Greenleaf Whittier Pickard and Philip Farnsworth. Pickard had already succeeded in improving detector technology for early spark reception and he would go on to patent several forms of crystal detectors that would make the old coherer detectors obsolete.

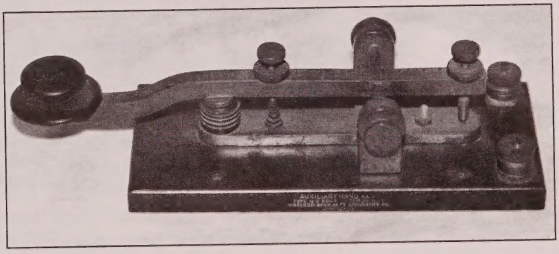
Farnsworth's background as a radio patent attorney complemented Pickard's engineering skill. His legal knowledge was indispensable in a field that would eventually be engulfed by patent disputes and lawsuits. WSACo. was incorporated in 1907, after Colonel John Firth brought his widespread business connections and sales abilities to the fledgling organization.

WSACo.'s early success centered around Pickard's crystal detectors. Soon after incorporation, he developed the IP76 crystal detector receiver. The U.S. Navy bought large quantities of these receivers to replace the older Slaby-Arco, DeForest, Shoemaker, Massie, and Stone receivers which were markedly inferior to the new design. In fact, the IP76 was standard Navy equipment until about 1914. WSACo. avoided legal battles by not manufacturing transmitters; the company lacked the rights to the necessary basic patents for this activity..

Another early WSACo product was the Leyden jar, an early condenser made of glass covered with tinfoil or copper. Apparently, Bohemian glass was superior to any other type of glass for this purpose. But during World War I, Bohemian glass was not available to U.S. manufacturers. Large quantities of low-loss power condensers for radio transmitters were needed, so a substitute material had to be found.

The problem was resolved by William Dubilier, who invented the mica condenser in 1916. Dubilier's original design was not acceptable, but improvements soon made the component satisfactory. The WSACo. product became known as the Faradon mica condenser and was supplied in vast quantity to the U.S. Navy during the war years. After the war, WSACo. had to settle a lawsuit with Dubilier, who brought action against the company for patent infringement.

In 1912, Colonel Firth sold his interest in WSACo. to the United Fruit Company and the offices were moved to Boston, MA. United Fruit owned a large fleet of ships and maintained an extensive radio communications service. In that same year, the Marconi wireless companies tried (and failed) to buy WSACo in order to obtain the company's patents. United Fruit operated the company from 1912 until 1921. Then WSACo. became a corporate partner in the Radio Corporation of America, which thus became owner of the patents.

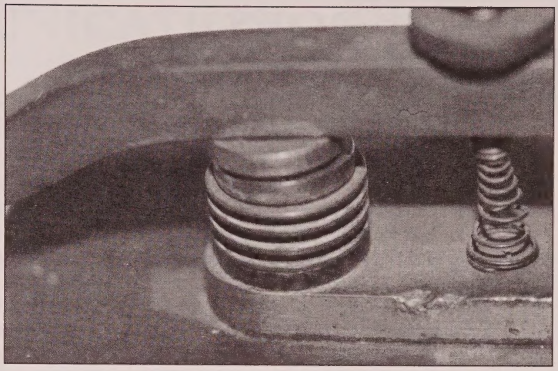


Hand key Type Q-S-5004 was designed for use with transmitters up to 5kW.

Because of WSACo.'s importance in the development of radio technology and its prominence as an early manufacturer of wireless equipment, the company deserves the attention of present-day wireless historians. Telegraph key col-

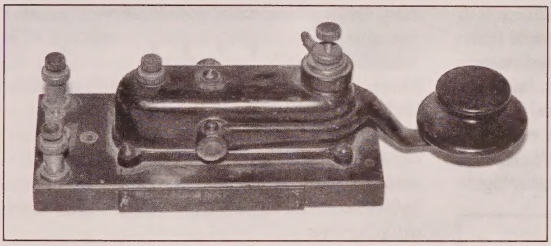
lectors prize instruments by WSACo. because of their massive dimensions and relative scarcity.

Since spark keys controlled the primary circuit of the transmitter, the contacts were subjected to high voltages and currents. Their contact surfaces were large in order to dissipate the large amounts of heat generated. A few manufacturers made spark keys with heat radiating flanges, now known as "cooling fins," attached to the contact surfaces. This kind of telegraph key was manufactured by WSACo, Marconi. Independent Wireless, and Lehmkuhl of Oslo, Norway.



Close-up of the heat-radiating flanges on the contacts of the Q-S-5004.

For example, WSACo. made a Type Q-S-5004 hand key equipped with these flanges. It was intended for use with transmitters up to 5 kW. Made of nickel-plated brass with ⅝-inch removable silver contacts, it could carry a current of up to 40 amperes without arcing or overheating. This 9 inch long key weighed in at one and a half pounds and was mounted on a heavy Bakelite base.



Flame-Proof key Type Q-S-505 saw service in submarines and aircraft.

The WSACo. Type Q-S-505 was an enclosed key designed to shield inflammable or explosive gases in the environment from contact sparking. It sported ¼-inch removable silver contacts and was designed to handle up to ten amperes of current. The key has a black japanned finish and a bakelite base. Its overall length is eight inches and it weighs 1¼ pounds.

Shortly after the Navy had begun using aircraft for surveillance purposes, it recognized the need for air to ground communications. The earliest attempt utilized a WSACo. IP76 receiver and a transmitter using a Ford spark coil. While the Q-S-505 was probably not used in these early experiments, it was later adopted by the U.S. Navy for use both in aircraft and submarines.

WSACo. made several other models of spark key. One was a version of the SE-68, one of the more common spark keys available to collectors today. Other manufacturers of the SE-68 were Liberty Electric, Kilbourne and Clark, Lowenstein Radio Co., the Machinery Division Boston Navy Yard, and Marconi's Wireless Telegraph Co. Other WSACo. models include the SE-653 (which is similar to the Q-S-505), the Flame Proof Type NS 1917, the CP-675, the light hand key type Q-S-504, and the Relay Key type Q-S-5003. The Q-S-5003 could handle currents up to 60 amperes! When using a Relay Key, the operator could remotely operate the spark transmitter using a standard telegraph key.

Pickard, Farnsworth, and Firth were certainly among the most colorful personalities of their time. The Wireless Specialty Apparatus Company which they created was one of the most prominent and interesting spark equipment manufacturers of the first part of the 20th century.

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2. *Wireless Specialty Apparatus Company, Radio Telegraph and Telephone Equipment* (catalog), Boston, MA., 1919.

3. *The Spark Key Project*, A Cooperative Effort by Collectors and Historians Worldwide, which can be found at http://www.zianet.com/sparks/sparkmakers2.html

NEW BOOKS AND LITERATURE

EDITED BY **WILLIAM E. DENK, W3IGU**, 81 STEEPLECHASE RD., DEVON, PA 19333-1226
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The Cosmic Inventor—Reginald Aubrey Fessenden (1866-1932)
By Frederick Seitz. Published by American Philosophical Society, 184 South 5th Street, Philadelphia, PA 19106. 6¾ by 10 inches, 77 pages, soft cover. Price $18 post paid.

As the first to transmit voice and music by radio, Fessenden is well known to AWA members. Many of you have no doubt read his wife's book *Fessenden—Builder Of Tomorrows*, published in 1940. But don't let your familiarity with that book cause you to ignore Seitz's contribution. Fessenden's impact on our lives is summarized on his tombstone in Bermuda with these words "His mind illumined the past and the future and wrought greatly for the present. By his genius distant lands converse and men sail unafraid upon the deep." Greatly to the benefit of the early development of radio, and in contrast to Marconi who, in this reviewer's opinion was essentially a "cut and try" experimenter, Fessenden was a true scientist, well grounded in mathematics and the physical sciences. His expertise was recognized by Edison for whom he worked. Edison in 1890, at Fessenden's request, gave him approval to work on wireless telegraphy. That was five years before Marconi started his first work. Regrettably he left Edison at about that time to accept a position with Westinghouse to work on the improvement of motors and dynamos. Later, foreseeing the need for a reliable source of constant amplitude radio frequency signals, Fessenden drew on his work at Westinghouse to begin design work on a high frequency alternator. He referred his needs to the General Electric Company, supplying them with his preliminary data. The work at GE was done by Alexanderson, who eventually produced a 200 kW alternator that could operate at 100 kilohertz. Interestingly, it was at Fessenden's suggestion that Marconi tracked and reported on the 1899 International Yacht Race on the east coast. This dramatically heightened public interest in the race, and in wireless, and made the public more aware of the many possibilities of radio.

♦ ♦ ♦ ♦

Machine Age To Jet Age III—Radiomania's Guide To Tabletop Radios 1930-1962
By Mark V. Stein. Published 1999 by Radiomania Publishing, 2109 Carterdale Road, Baltimore, MD 21209. 256 pages, 8 ½ by 11 inches, soft cover. $29.95, U.S. (priority) and foreign shipping free.

Without question, this is a most valuable book for radio historians and collectors of tabletop radios. The first twelve pages are devoted to factors that determine pricing, such as corrosion, tubes, dial problems, rodent damage, and cabinet materials, There is also reference to resources such as clubs and the internet, concluding with a page of parts suppliers.

The remaining 240 pages comprise a picture book with photos of twelve tabletop radios per page. That's 2880 radios in all! This reviewer, who does not collect tabletop radios of this vintage, found the book most interesting. The book is not provided with an index, but needs none since the radios appear in alphabetical order: from Abbotwares and Ace (there are two of the former and ten of the latter) to Zephyr of which there are sixteen.

With each radio pictured, there is a brief description. On page 68, by way of example, we have "Crosley, 615C, 'Cruiser,' c.1956, wood, 6 tubes, 3 bands, $145." ◙

SILENT KEYS

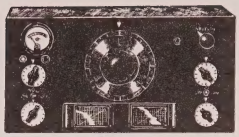
We record the passing of the following AWA members with deep regret.

DR. RALPH W. MUCHOW, 83 (3-4-00), noted collector (see feature article on Dr. Muchow elsewhere in this issue).

GOYN B. REINHARDT, W2AF, 92 (2-15-00), charter member of the AWA.

Note: AWA officers and members are requested to submit all information about Silent Keys, with or without special recognition, to Joyce Peckham, Secretary, Box E, Breesport, NY 14816. This will help in the collection, coordination and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

THE COMMUNICATIONS RECEIVER



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

A National Company Desk Mounted Radio Station

While leafing through the National Company promotional picture album from the late 1930s/early 1940s era I chanced upon a rather unusual ensemble: a complete National station mounted in a desk. This was years before the Johnson and Collins units appeared on the scene. Strictly speaking, we're straying a little from the subject matter of our column, but the photographs were too interesting not to share with you.

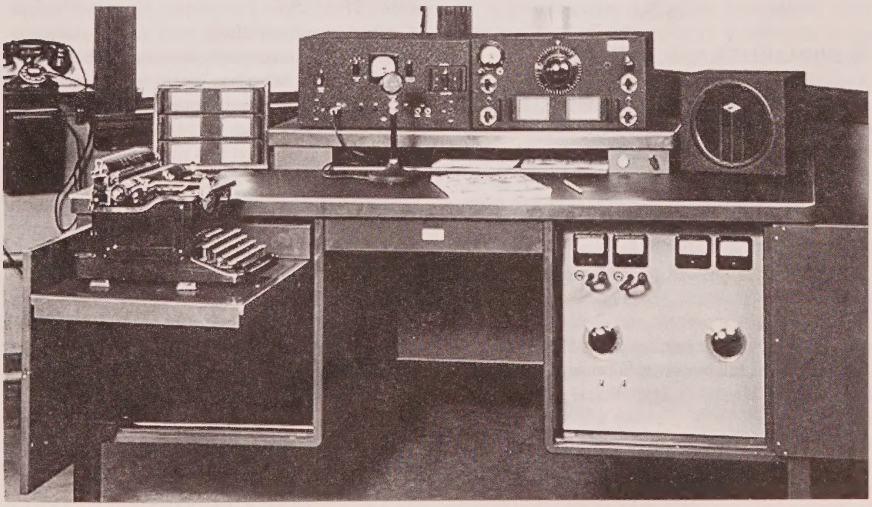
Looking at the general shot of the station, our "boat anchors" enthusiasts will spot a National HRO receiver with accessories, the National NTE exciter, and a custom transmitter built into the right-hand desk pedestal. The left pedestal contains the usual swing-out typewriter, and on a shelf at rear is early desk telephone with its separate ringer box mounted directly below.

In attempting to arrive at a date for this grouping, I reviewed product catalogs from the late 1930s and into 1941. Along with the style of typewriter (an L.C. Smith), the telephone design, and the inclusion of the name plate on the receiver, it is my guess that a good target date for the photos is sometime in 1940.

The receiver is the standard production HRO of the era, probably using the 2.5-volt glass tubes. The speaker resembles the type MCS, and the coil box contains the standard set sold with the receiver. The power supply is not visible, but is probably one of the well-known #697 "doghouse" stock units.

The NTE exciter-speech amplifier unit, to the left of the HRO, was part of a small line of National transmitting equipment. It was promoted as the ideal answer to transmitter control at the operating position. The multiband exciter circuit consisted of a crystal oscillator followed by three frequency multiplier stages using 6L6s tuned by National FXTB plug-in coil tanks. Four crystals could be individually selected by the switch in

(continued on page 57)



The National Company desk mounted station, opened and ready to use.

About Our
Feature Article Authors

ART BILSKI
Dr. Ralph "Doc" Muchow 1917-2000: A Friend Gone But Not Forgotten

Art Bilski has been collecting and repairing old radios since his first house needed furniture in 1975. He collects everything from crystal sets to chromed chassis. He is also trying to collect every Coke and Pepsi radio ever made. His collection of 300 radios is displayed throughout every room of his home. Art has been the Director of Public Relations for the Antique Radio Club of Illinois for the past 4 years.

WILLIAM N. COFFEY, W2PIX
Memories of a VOA Visit

Born in 1921, and a native of Wooster, Ohio, Bill was first licensed in 1938 as W8RPS. During World War II he served in the Army Signal Corps and operated as D4ADK in Bamberg, Germany. A graduate of M.I.T., he received his BS and MS degrees in electrical engineering in 1948.

Retired from the Research and Development Center of the General Electric Company in 1980, he continues amateur radio activity at his Extra Class station in Ballston Lake, NY. Operations are on all bands from 1.8 to 450 Mhz. Operating modes have included CW, SSB, fast scan ATV, FM, and packet radio.

His e-mail address is: <wncoffey@global2000.net>

H. RICHARD CRANE, Ph.D
Coherers Revisited

Dr. Crane is Professor Emeritus of Physics at the University of Michigan. He became interested in coherers as a young radio amateur (call: 6AFQ) in Turlock, CA, in the 1920s.

BILL FIZETTE, W2DGB
A Structured Approach to Fixing up those Nice Old Radios

Bill is AWA's current president and editor of *The OTB's* "The Communication Receiver" column. Read his full bio in the February issue (41-1).

RUSSELL KLEINMAN, WA5Y
The Wireless Specialty Apparatus Company (Key and Telegraph Column)

Russ has been a telegraph historian and, along with his wife Karen Blisard (N5IMW), a key collector, for almost 20 years. His interest was kindled when he received his first ham radio license 30 years ago. Although Russ specializes in spark telegraphy, he also is interested in early landline keys and unusual bugs. He is the author and programmer behind the interactive telegraph website called "The Sparks Telegraph Key Review," which can be found at http://www.zianet.com/sparks/index.html

HANK OLSON, W6GXN
The AC-DC Receiver

Hank, who became a Silent Key, on March 9, 1996, was a very frequent contributor to *The OTB*. This is one of several stories that had been in development at the time of his passing. We have no bio on file for Hank, and would be pleased to receive a few paragraphs of background information from someone who knew him well.

D.K. OWENS
Restoring Atwater Kent Power Packs

Besides being editor of our "Equipment Restoration" column, Ken Owens is a frequent contributor of feature articles to *The OTB*. Read his full bio in the February issue (41-1).

FIN STEWART
Early Australian Valves

Fin is a prominent Australian tube collector and historian, who has been very generous in sharing his published material with *The OTB*. Regretfully, we have no biographical information on file for him at this time.

KOJI WATANABE
Building an "All Japanese Five" Superheterodyne Receiver

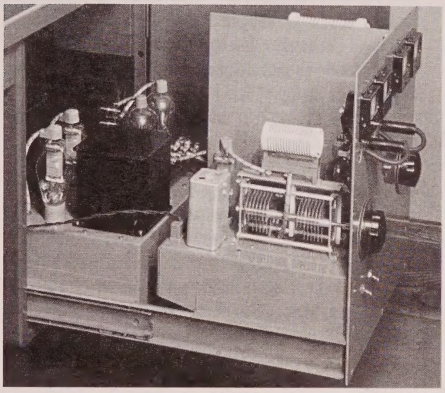
Born in 1964 in Japan, Koji has been interested in radio and vacuum tubes since high school days. He has built hi-fi equipment as well as many tube and transistor radios. Koji is now studying AM stereo broadcasting circuits and building a tube-type AM stereo tuner. He is also collecting literature on television receivers with an eye towards building a "state-of-the-art" vacuum tube television set.

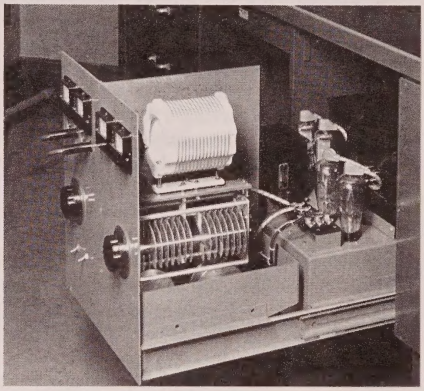
A graduate of Nagoya University, he holds a

master's degree in mechanical engineering. Koji works for Central Japan Railway company and is involved in designing the Shinkansen bullet train. His work includes studying the aerodynamical performance of the high-speed train using a low-noise wind tunnel.

An AWA member since 1992, he attended the Rochester conference in both 1996 and 1997.

COMMUNICATIONS RECEIVER, *continued from page 55*





The transmitter unit pulled out for servicing. At left you see the transmitter driver stage and, behind it, the power supplies. The large transformer is a Kenyon. On the other side of the transmitter, at right, is the output stage with its National UR-14A plug-in ceramic output coil assembly.

the plug-in multiple crystal holder on the right, and the correct frequency range selected by an interlocking push-button switch along the bottom of the panel. The speech amplifier delivered ten watts output from PP 2A3s.

The NTE shown in the photo is the standard amateur version covering 10, 20, 40, and 80 meters, although it would have been simple enough to create other frequency ranges by changing the coils and crystals. In fact, one version did cover the 5, 10, 20, and 80 meter bands.

The pedestal transmitter unit is an unknown, since this was probably a custom unit fabricated for the marketing department. However, some educated guesses can be made. At that time National did market a 600-watt rack-mounted transmitter. It used a pair of 100THs driven by a single 35T as a buffer, and was designed to be driven by the NTE exciter. The 300-watt Class B modulator featured a pair of zero-bias 203-Z tubes. The R.F. components, of course, were all made by National. A reasonable assumption would be that this circuit is similar to the 600-watt transmitter, and some of the sections may have even been taken from the National transmitter foundation units which were offered on the market at the time.

In looking over the layout, I wondered about the position of the receiver in relation to the typewriter, as it didn't seem to be a very practical arrangement. Granting that the HRO was supposed to be very stable, it wasn't all that good in 1940, and the operator would still have to tweak a dial or knob even when listening to a fixed frequency in the short-wave bands. However, we will make allowances. This was undoubtedly a promotional picture and the chances are that the station was never used as posed here.

All speculation aside, it would be an interesting project to duplicate this station. The HRO receiver is not too hard to come by, and most serious National collectors have at least one NTE exciter. The transmitter unit could be fabricated to resemble the photos, using National parts which are still available. As for the desk, the typewriter, and the telephone, all can be found. Anyone for a challenge?

BY HANK OLSON,W6GXN, SILENT KEY — MARCH 9, 1996

THE AC-DC RECEIVER

The concept is simple enough: make an AM broadcast receiver cheaper and lighter by eliminating the power transformer, putting all the heaters of the tubes in series like Christmas tree lights. For those readers whose Christmases started after World War II, such lights were series strings of colored lamps of a dozen or so, each having a 10-volt filament. Putting 12 in series, the voltage-drop would add up to 120 volts; and so a single-wire string of 12 could be operated directly on the 120-volt line.

The lack of a power-transformer (which, of course, is an AC-only device) had the useful side benefit of allowing such a radio to be operated from DC mains (then still fairly common in the downtown sections of large cities) as well as AC power. Hence the term "AC-DC."

The down-side of this arrangement was that when any one lamp failed, the whole string went out. Then came the laborious job of using a (hopefully good) bulb to substitute for each one in the string until the lights came on again. The same method was used in city street lighting—except at a higher current level, with constant-current transformers at the lighting power station, and with special links across each street light which would short out (from higher voltage) when a lamp opened up.

The series-string heater radio wasn't practical until special tubes were built for this service. The indirectly-heated cathode sleeve of such a tube needed to be sufficiently insulated from the heater to survive a worst-case voltage stress of about 160 volts. The first AC-DC radios used six-pin tubes like the 75, 76, 77, 78, 25Z5 and 43. All of these had 300-mA heaters. When series-connected, this tube string fell short of making up the required 120 volts to operate directly off the line. Look at Example 1 in the table. Here we have two 25-volt heater tubes (25Z5 and 43) and five 6.3-volt tubes (75, 76, 77, 78, 78) for a total of about 82 volts.

In order to operate directly from the 120-volt line, a resistor line cord was used to drop the remaining 38 volts. This line cord was required to dissipate 38 V X 0.3 A = 11.4 Watts; it was usually asbestos-insulated like the ironing cords of the day (no EPA existed then).

The next series of six- and seven-pin, 300-mA heater tubes (Example 2) made the AC-DC receiver a little simpler by combining the oscillator and mixer functions into a single pentagrid converter tube. The reduced tube count, of course, resulted in a smaller total voltage drop (75.2), requiring a line cord of higher resistance to drop still more voltage. Note that most of the tube types in this string are designated by the newer nomenclature, in which heater voltage is indicated by the first one or two digits. The next generation of AC-DC radios (Example 3) had octal-based tubes, which came in either glass or metal envelopes. However the voltage drop of the string remained unchanged, still requiring the maintenance-prone line-cord resistor.

Manufacturers wishing to produce a set at lower cost (and with lower performance) than shown in Examples 1-3, could leave out the r.f. amplifier tube. Of course the missing heater would have to be compensated for by adding additional resistance to the line cord in order to drop an additional 6.3 volts.

Since AC-DC circuit design involved connecting one side of the power line to chassis ground, it could be very dangerous to connect the set to an external ground and antenna. Depending on the orientation of the power plug, this could place a dead short across the power line and/or present a serious shock hazard at the antenna. As a result, small self-contained loop antennas were developed.

These were practical because radio stations had become both more numerous and more powerful. Placed inside the receiver's wood or Bakelite cabinet, the loop did not represent a shock hazard. In addition, freeing the radio set from the antenna and ground connections meant that it could be placed anywhere in the user's home.

Eventually, a newer series of octal tubes (Examples 4 and 5) was engineered to altogether eliminate the line cord resistor. These tubes drew 150 mA and operated at higher voltages. The heater string of Example 4 adds up to 121 volts.

This tube complement was so widely used that it became known as The "All-American Five." For upscale versions of this set incorporating an r.f. stage, a lower-voltage a.f. amplifier tube (35L6) was substituted for the 50L6 to compensate for the additional heater.

The All American Five circuit dominated the low-cost broadcast-receiver field, and these tubes became available from nearly all manufacturers at very low prices. I can recall, in the late '40s, that the jobber who supplied our service shop would include a free 35Z5 with each $10.00 in RCA tubes that we ordered. The 35Z5 was the most failure-prone in the string because its heater was tapped, to operate a #47 dial lamp. If the #47 opened up, then burnout of the 35Z5 heater was accelerated.

Philco and Zenith were prone to use a loctal-based version of the All-American Five tube string (Example 6). The tubes whose designations begin with 14 are really 12-volt tubes; the "14" is used to indicate a loctal base. The 50A5 was replaced with the lower-heater-voltage 35A5 if an r.f. amplifier (14C7) was to be added. As with the octal series heater current was 150 mA.

The technological advances made during World War II were applied to create a new "All American Five" series of miniature tubes without the relatively expensive bakelite octal bases (Example 7). As with the octal- and loctal-based series, the 50C5 could be replaced with a lower-heater-voltage version (35C5) if an r.f. stage was to be added. The 35W4 heater had a tap for a #47 pilot lamp.

The new, miniature string was a manufacturer's dream: it lent itself to compact, lightweight designs that were inexpensive to build. However, the tubes ran hotter, which resulted in a shorter lifetime and, sometimes, melted plastic cabinets. Associated components, such as both paper and electrolytic capacitors, did not fare well in the heat either.

The octal versions of the tube string, which were in large production prior to World War II, were given Army VT numbers and became the mainstays of military radio equipment. Who can forget the "command sets" with their 12SK7s and 12SR7 (a low-mu variant of the 12SQ7)? The 12-volt heaters were perfect for the 12- and 24- volt DC systems used in aircraft and other mobile equipment.

The 12SK7 became the VT-131 and the 12SR7 the VT-133. The 12SA7 (VT-161) was not used in command sets, but found application elsewhere, as did the 12SQ7 (VT -104).

In the 1945-46 period, Hallicrafters released its AC-DC communications receiver, the S-38, using the octal All american Five line-up. A successor to the S-41 and Echophone EC-l, it was made to sell at a rock-bottom price and had no RF amplifier. Cost-reduced versions, the S-38A through S-38E, used a clever circuit technique to cause the IF stage to oscillate in the "CW" position and serve as both IF amplifier and BFO. This same general lineup and technique would be used in the National SW-54 and some of the Heathkit receivers, years later.

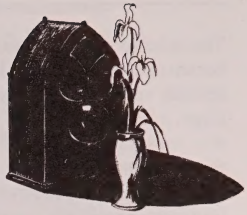
The lack of an RF stage, and other shortcomings, did not put these receivers at the top of most amateurs' wish lists, but it made a commercial short-wave receiver economically avail-

(continued on page 62)

TYPICAL AC/DC TUBE COMPLEMENTS

EXAMPLE	R.F.	CONV.	MIXER	OSC	I.F.	DET/ 1ST A.F.	A.F. OUT	RECT
1	78		77	76	78	75	43	25Z5
2	6C6	6A7			6C6	6C7	43	25Z5
3	6K7	6A8			6K7	6Q7	25A6	25Z6
4		12SA7			12SK7	12SQ7	50L6	35Z5
5	12SK7	12SA7			12SK7	12SQ7	35L6	35Z5
6		14B8			14C7	14E6	50A5	35Y4
7		12BE6			12BA6	12AT6	50C5	35W4

RECENT RADIO, TV AND ENTERTAINER OBITUARIES



COMPILED BY **CHARLES S. GRIFFEN W1GYR**
1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405

Note: When known, the date of death is indicated in parenthesis.

WILLIAM C. BROWN, 82, (2-3-99) pioneer in microwave power. Upon graduation from MIT, Brown was hired as an aide to Percy Spencer, who would later invent the microwave oven at Raytheon. Later, he was the key engineer in the production of Magnetrons at Raytheon during WWII and he led the post-war build up of microwave tube R & D at the firm. Brown's primary technical advances included the development of the cross-field amplifier (CFA), a device used in systems like the Apollo moon vehicle and the Patriot missile system.

BILL CRAWFORD, 70, (11-19-99) former CBS News producer. Crawford was the Senior Broadcast Producer for *CBS Evening News* with Dan Rather from the mid-1980s until his retirement in 1991. He began his career with the CBS radio network in 1961, but soon moved to television news, becoming a writer and producer for network's news anchor, Douglas Edwards. Crawford pioneered the network's first weekend newscast in 1962 and helped produce every national political convention from 1968 to 1988.

STUART CRAIG, 66, (10-30-99) Chairman and CEO of Craig Broadcast Systems. Craig took over the firm from his father, John, who founded it in 1948. Today it is Canada's largest family-owned broadcasting company, operates six radio stations and four television stations, and has a cable and international division. Craig pioneered a form of cable that uses line-of-sight microwave transmitters called SkyCable TV. SkyCable has 6,000 subscribers in Canada, making it the largest system of this type in the world. Craig also operates a SkyCable TV station in California and has plans for one in New Zealand.

ALVIN G. FLANAGAN, 84, (11-24-99) retired President of Gannett Broadcasting. He began his television career with the Don Lee Network on the west coast in 1948. Flanagan was named Program Director of KFMB(TV) San Diego in 1949 and was appointed Program Manager of the Western Division of ABC and KECA(TV), now KABC(TV), in 1951. In the early 1960s he joined Mullins Broadcasting as VP and GM of KBTR(AM) and KBTV(TV), now KUSA(TV), in Denver. Flanagan became President of Mullins in 1969 and remained in that position when the firm was purchased by Combined Communications. When Gannett merged with Combined Communications in 1979, he was named President of Gannett Broadcasting. Flanagan became Chairman of Gannett in 1982 and retired a year later.

LEONARD H. GOLDENSON, 94, (12-27-99) television executive. In the early 1930s he was hired to reorganize the New England theaters of the bankrupt Paramount Pictures and by 1938 was appointed to manage all 1800 Paramount theaters. Goldenson was President of United Paramount Theaters from 1951 to 1953. In 1953 he received FCC approval to purchase the struggling American Broadcasting Company (ABC) for $24.5 million. Through innovative programming and taking risks he turned ABC into a contender against CBS and NBC. Goldenson was President, CEO and Chairman of ABC, retiring in 1986 after the network merged with Capitol Cities Communications, Inc. By then ABC was valued at $3.5 billion. Capitol Cities/ABC was bought by Disney for $19 billion in 1996.

HERBERT G. JOHNSON, 79, W6QKI (ex-W7GRA) (2-1-00) founder and former owner of Swan Electronics Corp. Swan manufactured amateur HF and VHF transceivers in the 1960s and 1970s in Oceanside, CA. In 1971 it became a subsidiary of Cubic Corporation. Later Johnson formed Atlas Radio, which produced solid-state transceivers including the popular Atlas 210. Prior to going into business for himself he was employed by Gonset, Inc.

MADELINE KAHN, 57, (12-3-99) actress and comedienne. Kahn is probably best remembered for her film roles in *Paper Moon* (1973) and *Blazing Saddles* (1974). She made her film debut in *Kiss Me Kate* in 1965. Some of Kahn's other film credits include *Young Frankenstein, High Anxiety, The Adventures of Sherlock Holmes' Smarter Brother* and *Mixed Nuts*. Kahn's Broadway credits include *New Faces of 1968, Two by Two, On the Twentieth Century*. In 1993 she won a Tony Award for her performance in *The Sisters Rosenweig*. Kahn appeared on such TV shows as *Comedy Tonight* (1970); *Oh, Made-*

line (1983-1984); *Mr. President* (1988) and *New York News* (1995). She was a regular on CBS' *Cosby* until her health failed last fall.

SAM H. KAPLAN, 85, (1-22-00) co-inventor of the Chromacolar picture tube. In 1969, while an employee of the Zenith Corporation, he and Joseph Fiore invented the Chromacolor picture tube which doubled the brightness of color television sets. The invention made Zenith the leading color television brand in the 1970s after a ten-year struggle with RCA. Kaplan, credited with more than 50 patents, retired in 1989 as Zenith's Director of Television Research.

JOSEPH FABER KEITHLEY, 84, (10-1-99) founder of Keithley Instruments, Inc. After graduation from MIT he joined the technical staff of Bell Laboratories in New York City. In 1940 he became an engineer at the Naval Ordnance Laboratory in Washington, DC. After WWII he worked for Massa Laboratories in Cleveland, OH. In 1946 Keithley started his business in Cleveland to produce the Phantom Repeater, an amplifier for low-level electrical signals. The firm is now a leading manufacturer of scientific instruments and systems with annual sales of over $100 million. He retired in 1991.

HEDY LAMARR, 86, (1-19-00) actress and inventor. Lamarr, an Austrian native, dropped out of school to pursue her dream of becoming an actress. In 1930 she made her debut in a German film, *Money on the Street*. In 1937 Lamarr moved to Hollywood and a year later appeared in her first American film, *Algiers*. Some of her other film credits include *White Cargo* (1942), *Tortilla Flat* (1942), *Samson and Delilah* (1949) and *The Female Animal* (1957). Lamarr and George Antheil developed and patented a torpedo guidance system which exploited the use of random radio frequencies. The technology later became the basis for today's "spread spectrum" used in cellular phones, facsimile machines and wireless internet access technologies.

CLAYTON MOORE, 85, (12-28-99) actor. Moore, the best-known television *Lone Ranger*, played the role from 1949-1952 and from 1954-1957 on ABC. *The Lone Ranger* was originally heard on radio during the 1930s, 1940s and 1950s. Moore's career included performing with a flying-trapeze act, modeling and appearances in such movie serials as *Dick Tracy Returns* in 1938. Other film credits include *The Lone Ranger* (1956) and *The Lone Ranger and the Lost City of Gold* (1958). After leaving the show he made appearances as *The Lone Ranger* at rodeos, in parades and other public events.

AKIO MORITA, 78, (10-2-99) co-founder of Sony Corporation. Morita and his partner, Masaru Ibuka, started Sony in Tokyo after WWII. It became an international leader in innovation with such products as the pocket-sized transistor radio, the videocassette recorder and the Walkman. Sony also became a leader in the entertainment business, acquiring CBS Records in 1988 and Columbia Pictures in 1989. In 1991 Morita became an honorary member of the IEEE and in 1994 he was awarded the IEEE Founders Medal "for distinguished corporate leadership and for a lifetime of innovative contributions in bringing advanced technologies to consumer electronics products."

ELLIOTT M. SANGER, JR., 77, (11-19-99) a news producer. When *The New York Times* was closed due to a strike in 1962, Sanger headed a project to have nonstriking correspondents broadcast on WQXR(AM), a station owned by *The Times*. It proved so successful that it continued long after the strike ended. In 1970 Sanger became the Executive Producer of *Insight*, a nightly program of news analysis. During a four-decade career Sanger held a number of positions with The New York Times Company and at WQXR which his father, Elliott M. Sanger, Sr. helped begin in 1936. WQXR was purchased by *The Times* in 1948.

FERDINAND W. SCHOR, 94, K6HPB (1-14-00) a former Chief Engineer of The Hallicrafters Company. Schor was responsible for the design of many Hallicrafter products and receivers during WWII and in the years that followed. Some of the receivers he designed included the S-40, SX-42 and SX-62.

HANK SNOW, 85, (12-20-99) country music singer. Known as *The Singing Ranger*, he recorded more than 40 songs that were in the top 10 of the country music charts and sold an estimated 70 million records. Some of Snow's hit records included *I'm Movin' On, I Don't Hurt Anymore, Golden Rocket, Music Makin' Mama from Memphis* and *I've Been Everywhere*. He began singing on *The Grand Ole Opry* in 1950 and continued with them into his 80s. Snow was inducted into the Country Music Hall of Fame in 1979.

PAUL M. WILSON, 75, W4HHK (11-29-99) VHF-UHF pioneer. He earned his amateur radio license in 1941 at age 16 which began his life long experimentation using VHF and UHF frequencies. In 1954 he and Tommy Thomas, W2UK, were the first to send and receive reports via 2-meter meteor scatter over a 950 mile path. Some of his other accomplishments included making 70 cm Earth-Moon-Earth contacts in 1965 and monitoring the Apollo 10 command module on 2.2 GHz in 1968. Wilson was an engineer with WMC(TV) in Memphis, TN from 1950 until his retirement in 1980.

EARLY WRIGHT, 84, (12-10-99) disc jockey. One of the south's earliest black disc jockeys, Wright joined radio station WROX in Clarksdale, MS in 1947 and remained there until his retirement in 1997. His broadcast was heard six days a week in the Mississippi Delta from 6 o'clock to 11. During the first three hours he was the "Soul Man," playing the blues and for the last two hours he was "Brother Early," playing gospel music. Wright, who was seldom seen without a coat and necktie, spoke the language of his listeners and ignored advertising copy, preferring to extemporize.

Information for this column was obtained from *Broadcasting and Cable*, *The Complete Directory to Prime Time Network TV Shows 1946 - Present* (4th ed.), *The Hartford Courant, On the Air: The Encyclopedia of Old-Time Radio, Shortwave Receivers Past and Present: Communications Receivers 1945-1996* (2nd ed.), *The New York Times, QST* and *Variety*. Thanks to Dr. John M. Anderson, Edward M. Gable, K2MP; George E. Hausske, W90LE: Fred Swanson, John B. Victery, Richard B. Waddell and Dr. A. David Wunsch for additional source material.

AC-DC, *continued from page 59*

able to thousands of new hams and SWLs.

The series-heater design technique even reached far into the era of TV receivers. Since TV sets required a considerable number of tubes, these special series-string TV tubes had very different heater voltages than those used in AC-DC radios or in transformer-powered radios or TV sets. For instance, the standard 6AF4 (UHF-TV local oscillator) became a 2AF4 (with a 2.35-V, 0.6-A heater) and a 6BQ6 (horizontal-output beam tube) became a 17BQ6 (with a 16.8-V, 0.45-A heater). Though these examples were from designs using 0.6-A and 0.45-A series strings, but 0.3-A strings were also used.

Generally, if one finds a tube which has a recognizable last three characters (not counting envelope descriptions like "GT") and an "odd" first digit or two, it's a series-string TV tube. There are many examples in the 2-, 3-, 4-, 5-, 7-, 8-, 9-, 10-, 11-, 13-, 14-, 15-, 19-, 20-, 21-, 22-, 25- and 26-V categories. The series-string TV tubes extended into the "last- gasp" era of tube design; even Nuvistors and Compactrons were made in the odd-heater-voltage-series-string types (the 2CW4 and 13J10 are examples).

By the time series-string-heater tubes were being used in TV sets, solid-state rectifiers (selenium or silicon) were available for their half-wave doubler power supplies. Doublers were generally required to get the plate voltages required to operate the deflection circuitry.

The author worked at a radio-repair shop from before high school graduation (1949) until after graduation from college, starting with floor-sweeping and going on through radio and TV repair. During this span of nearly a decade, he had a chance to work on a variety of AC-DC radios. under the tutelage of a senior radio tech. His after-school/Saturday job was to open each radio up, run the tubes through the Hickok tube checker, replace bad tubes (usually only one had an open heater), squirt "No-Ox" contact cleaner into the volume control and on the tuning-capacitor shaft and try the radio again.

If it sounded ok, the set was re-installed in its cabinet and pushed down the workbench to "C. J." for final checkout. If he approved (hopefully), C.J. would make out the bill, enter the work done in his service record book, and refrain from giving his underling a swift kick in the backside. If his practiced ear determined that the i.f.s needed tweaking, or he felt the sound was "mushy," or some other problem, then the kick was delivered and the set reopened for further work.

Occasionally, in the repair business, one gets a set that is "intermittent;" that is, it plays just fine most of the time in the shop, but not at the customer's home. These cases are real time-wasters, as they can play for days (while the customer calls daily to ask "Why isn't my radio ready; the World Series is on next week?") We'd simply have to wait until the radio stopped before repairs could even be attempted.

Sometimes these "intermittents" were so sensitive that the very act of touching the heater pins with a voltmeter probe would jiggle the open tube-heater back to life. In cases like these, we'd put an NE-2 neon lamp and 100K series resistor across each heater in the string and wait until the open-heater fault occurred. Then, without even touching the set, one could see which tube heater was open, as it had the full line voltage across the neon/resistor combination.

Well, this float down memory lane has been fascinating (for the author, anyway). It is hoped that the other "tube men" may have enjoyed it too. Doubtless, some items may have been skipped over, and perhaps a few where things were "remembered" as they "ought-to-have-been." But with a dog-eared copy of the *RCA Receiving Tube-Handbook* (RC-19), various old ARRL *Handbooks*, and Brans' 20th Edition *Vade Mecum*, the author has tried to make the details accurate.

THE VACUUM TUBE

EDITED BY **BRO. PATRICK DOWD, F.S.C., W2GK**, 4415 POST RD., THE BRONX, NY 10471-3499
PLEASE INCLUDE SASE FOR REPLY.

RCA's : "Special Red" 10,000-Hour Tube

Almost from the very beginning, receiving tubes found many applications in industry. They have been used in circuits for temperature regulation; motor control; lighting equipment; measuring equipment; counting and sorting devices; railway signalling equipment; computers; communications (including broadcasting); navigation equipment; devices for overload and overspeed protection; devices for the protection of machine operators; and much more.

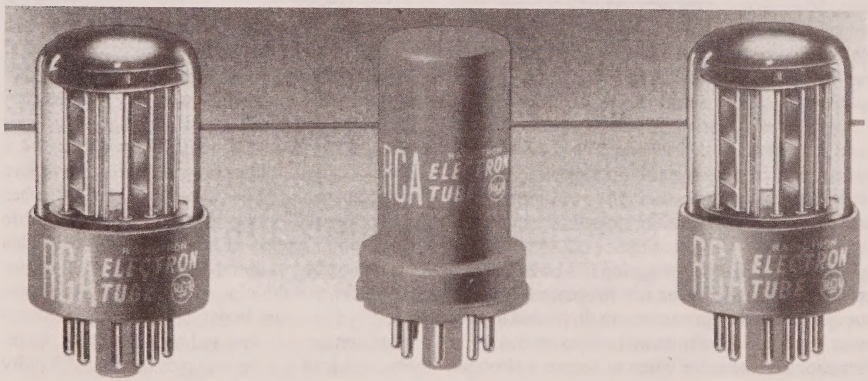
Generally speaking, industrial applications include all types of equipment in which the primary considerations of design and use are revenue or safety. This requirement generally excludes the use of tubes in home radio receivers or in toys. In a typical industrial application, uninterrupted tube performance is necessary for the preparation of a product, or the maintenance of quality, or (as in broadcasting) the maintenance of a service from which revenue is obtained. The unexpected failure of a tube in industrial service can frequently result in a monetary loss far greater than the initial cost of the tube. However, the failure of a tube in a home receiver generally is only a matter of inconvenience, and the loss is no more than the tube replacement cost.

According to a story I heard from George Rose (retired RCA) some years ago, a meeting was held in New York City, in early 1948, between certain industrial companies and the larger tube manufacturing companies. The industrial companies expressed their dissatisfaction with the poor reliability and short life of receiving tubes when used in industrial applications.

One by one, the tube manufacturers presented their solution to these problems. RCA had anticipated these problems far in advance of the meeting and had set out to develop a line of tubes that would remedy these difficulties. RCA made the final presentation, distributing samples of their new "Special Red" tubes made specifically for industrial applications. As might be expected the industrial companies were delighted while the tube manufacturers felt they had been delivered a knockout blow.

Performance features of the new tubes

The three new industrial types developed were very similar in electrical characteristics to three popular receiving tube types frequently used in industrial applications. The type 5691 was a hi-mu twin triode, similar to type 6SL7-GT except for requiring 0.6A heater current in-



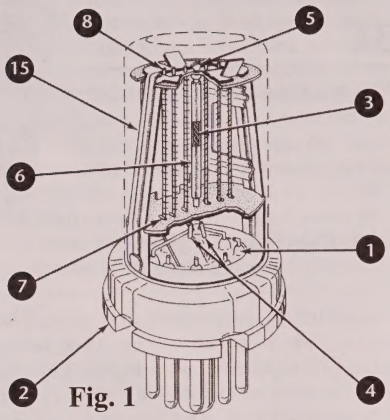


Fig. 1

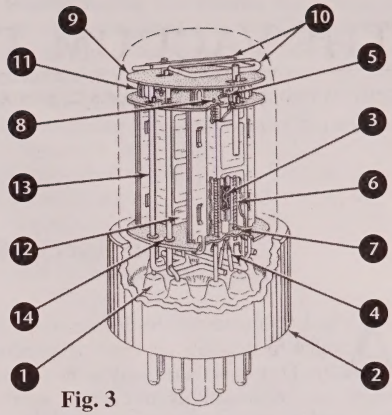


Fig. 3

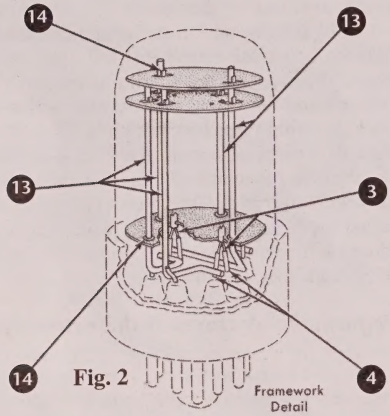


Fig. 2

1-*low-leakage button stem;* **2**-*Non-hygroscopic base;* **3**-*Pure-tungsten heater for high mechanical strength;* **4**-*Sleeves on heater legs insure good mechanical and electrical bond between heater and heater leads;* **5**-*Cathode sleeves locked to mica insulator;* **6**-*Grid plated to minimize variation in contact potential;* **7**-*"Stops" prevent vertical movement of grid rods;* **8**-*Grid rods fit tightly into mica insulators;* **9**-*Extra mica insulator provides getter shield;* **10**-*Two getters for long life;* **11**-*Plates held rigid by plate ears wedged into mica insulators;* **12**-*Plates are designed to minimize electron coupling between units;* **13**-*Mount secured by five supporting rods;* **14**-*Twelve reinforcing eyelets provide a firm bond between mica insulators and five supporting rods;* **15**-*integral "A-Frame" for strength.*

stead of 0.3A. The type 5692 was a medium-mu twin triode similar to the type 6SN7-GT. The type 5693 was a sharp-cutoff pentode similar to type 6SJ7. The basing connections of these new types were identical to their counterparts and they could be interchanged with them (provided, in the case of the 5691, that the higher heater current could be supplied). Long life for the "Special Red" tubes was assured by the choice and inspection of the materials used, by the use of careful processing and assembling, and by conservative ratings which provided for moderate current per unit area for the cathode and moderate power dissipation per unit area for the plates and grids. Pure tungsten wire was used in preference to alloy wire for the heaters because tungsten wire has greater strength. Nickel tubing was used around the heater wires at the weld junctions to the stem wires to secure a stronger weld, thus preventing breakage or burnouts at these points, particularly under conditions of frequent "on-off" switching.

The heaters for the separate sections in the 5691 and 5692 twin triodes were connected in series. This arrangement permitted the use of heavier heater wire. In addition, series connection of the heaters in twin-unit types was preferred in many industrial applications; "fail-safe" considerations made it desirable that a heater burnout render both sections inoperative simultaneously. When the "Special Red" tubes were operated within ratings, their average life was well in excess of ten thousand hours. This figure represents about fourteen months of continuous round-the-clock service. Long life is especially important in devices or systems using a large number of tubes and in cases where the replacement of a tube presents unusual difficulty

or expense.

Uniformity and stability of characteristics for an individual tube during its life, and among tubes of a given type, were very important in industrial applications. Uniformity was achieved by great care in the selection and inspection of materials, gauging of parts, and inspection and testing of the tube assemblies before they were sealed in their enclosures. In addition, numerous tests were made on the finished tubes, and the limits employed were more stringent than for normal receiving tubes.

The "Special Red" tubes were seasoned for a long period of time before final testing. This process minimized changes in characteristics during operation. The precautions taken to insure uniformity and stability led to exceptionally good balance between sections in the twin-triode types 5691 and 5692. They could, therefore, be used without balancing adjustments in many applications. In more critical applications, the range required for balancing controls was minimized, and the balance obtained by adjustment was maintained for long periods.

Ruggedness was achieved, primarily, by the use of rigid structures. This feature was important because industrial applications included some in which vibration was difficult to avoid and in which the tubes sometimes had to operate under severe impact conditions.

Structural features

Fig. 1 shows the construction used in type 5693. For this type, an all-steel A-frame structure (15) is used to support the electrode assembly. The A-frame support is welded directly to a steel ring; a glass button (1) sealed inside this ring carries the leads connecting the electrodes to the base.

Figs. 2 and 3 show the construction used for types 5691 and 5692. The electrode assembly is held together by five supporting rods (13) welded to eyelets (14) in the top and bottom mica insulators. A third mica disk (9) is supported by two of these rods; this disk prevents the material evaporated from the two getters (10) from reaching the electrodes. The electrode assembly is supported by eight lead wires in a button-type stem (1). The total support given by the lead wires is very rigid, although the individual wires are soft enough to prevent excessive stress on the glass seal.

Some of the features common to all three "Special Red" types are:

1. The cathode has an embossed ring (5) near the upper end. This ring is pressed against the lower side of the upper mica insulator, and the part of the cathode sleeve extending above the mica is then squeezed and welded to clamp the cathode sleeve in position. A very close fit between the cathode sleeve and the holes in the mica insulators is maintained. The effectiveness of this method of assembly in reducing variations in characteristics under vibration and shock conditions has been proven in many RCA types where stability of characteristics and low microphonics are necessary.

2. The supporting wires for the grids are provided with metal stops (7) to prevent the distortion of the fine grid wires which could result from vertical displacement of the supporting wires in the mica insulators.

3. The fit between the grid support wires (8) and the holes in the mica insulators is so close that some pressure is required to force the support wires through the insulators. As a consequence, more time is required by an operator to put a tube together, but, as a result, the tube is sturdier and much harder to shake apart.

4. The red bases used on the "Special Red" tubes are made of materials which ensure low moisture absorption and very high resistance between terminals under high-humidity conditions. The bases are molded with barriers between the pins to reduce leakage even further.

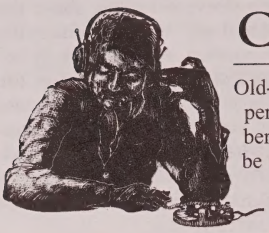
Quality control

All of the "Special Red" tubes were tested during manufacture under vibration to detect any looseness of the elements which might cause premature failure. Life-test data showed that the tubes were capable of performing well under adverse conditions. When operated under continuous vibration at 20 cps and 2.5 g acceleration with full voltage applied, for hundreds of hours, the change in important tube characteristics was less than 10%. Shock tests with impact accelerations as high as 500 g have been made on these tubes. The tests indicate that the tubes can withstand impact shocks of 100 g for extended periods and impact shocks of 500 g for short periods.

Applications

The "Special Red" tubes were, in general, intended for use in the same manner and in the same circuits as their receiving-type counterparts. The 5693 was recommended as a high-gain audio-frequency amplifier, or a DC amplifier, particularly when the source of input signal was a phototube, a crystal, or a similar high-impedance source. The low value of the grid current

(continued on page 69)



CLASSIFIED ADS

Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551**.

IMPORTANT!

OTB classified ads are now available for browsing in the "*OTB On Line Edition*" on our internet web site (www.antiquewireless.org). This practice will give members dramatically increased exposure for their ads.

SELL/TRADE—BC/SW TUBE RADIOS

Radiola Special one tube set. Missing metal cover. Will trade for a Federal 59. Can bring this set to NARC at Minneapolis meet in May. Phillip Drexler, P.O. Box 16445, St. Paul, MN 55116

Atwater Kent radios: Model 20 compact and big box, 30, 32, 35, 37, 42, 43, 44, 46, 49, Crosley 51, 601 console, Trirdyn Super Special and others. LSASE for lists. Ray Schmidt, 607 1 Ave., S.W., Austin, MN 55918 (507) 433-0069

SE143 radio. Will trade only. Want WSA or similar wireless equipment. Richard Howard, 9999 S.E. Frenchacres Drive, Portland, OR 97266, (503) 775-6697, E-mail: dhoward503@msn.com

SELL/TRADE—COMMUNICATIONS GEAR

Johnson Viking Invader 2000, brand new, box never opened in 38 years. Unbelievable but true. Listing on E-bay on May 4. Robert Fortman, WE2T, 65 Aleta Dr., Rochester, NY, 14623-5524, E-mail nineto5@localnet.com, (716) 334-1103

SELL/TRADE—GENERAL

100 watt system mounted in a Barzilay oiled walnut three-piece cabinet, Model 80E. It consists of a 4 ft. long console and two 2 ft. speaker cabinets all enclosed by tambour doors and a horizontal top-lift door on the equipment console Inside has H.H. Scott 296 integrated dynaural laboratory amplifier, Fisher 200B FM tuner, Collaro RC-440 turntable/changer. Also 50 factory recorded stereo tapes (7½") and 200+ LP records of 1950s and 1960s and some classical records Speaker cabinets are bass reflex for 15" woofers and 10" conversion adapters. A Roberts 997 tape deck sits on top. SASE for full details Francis H. Yonker, 1229 Inverary Place, State College, PA 16801

Hundreds of 1925-1970 items for sale or trade Console and table radios, phonographs, test equipment, television sets, tubes, phonograph cartridges/needles and service data LSASE with two stamps for details Ray Seppeler, 8 East Main St., Sodus, NY 14551 (315) 483-8451 days, (315) 926-5696 evenings E-mail: rrseppeler@aiusa.com

Stromberg-Carlson TS-16-10M "Somerset" 16" round TV, radio and 2 record players, beautiful original cosmetic condition. Must move also a Sparton 7-36 radio/phono console and numerous surplus radios, chassis, etc. Some are restored and some need work. Visitors welcome to my museum and any offers considered. Malcolm Burdick, W1NOO, 156 Station Rd., Hampton, CT 06247, (860) 455-9640 before 8:30 p.m

Assembly and operation manual for 1947 10" Telekit TV with decals, schematics, etc., $28.; instructions and diagrams for 1952 Tech-Master kit TV, $15.; audio discs, blank record discs, $3. each; 62 new and used vibrators, $310 for all; large TV

shop manuals, Emerson, Westinghouse, Dumont, G.E., Stromberg-Carlson 1946-1954, $10. each.; 10" × 13" TV magnifier, $20.; 2" and 3" electrostatic CRT's, 12 assorted for $85.; Riders TV Vol. I and Vol. II, both $50 SASE for large list. Bill Rolf, 30131 Center Ridge, Westlake, OH 44145n (440) 871-4547

SELL/TRADE—LITERATURE

Sams #1-220 in Sams 4 drawer cabinet, $150. Ronald Graves, 3120 N. 72 Way, Hollywood, FL 33024-2423, (954) 964-2063

Fifty-three copies of *QST* in good condition (covers fair) from 1945 to 1950 as follows: 1945 - Aug., Oct., Nov., Dec., 1946 - missing April, 1947 - missing Jan., Feb., Mar., June, 1948 - missing Jul., Sept., Oct., Nov., 1949 - missing Jan., June, 1950 - complete Best offer for lot takes all Bob Lindsay, 16564 Farley Road, Los Gatos, CA 95032-3518n E-mail: bobl@easywaresoftware.com

Canadian Radio Schematics: Do you need a schematic for a 1924-1967 Canadian made tube radio? If so, please advise of Canadian Make/model. $4. per schematic to David Cantelon, 42 Clematis Road, North York, Ontario, Canada, M2J 4X2 (personal checks from AWA members fine) E-mail: JustRadios@yahoo.com

1928-43 European radio schematics; tube gooks: Sylvania, Tungsram, Purotron, Vade-Mecun; French radio magazine "Toute la Radio" 1936 volume, Radio News February 1944 special issue, 1925 U.S. Army radio sets (Part I), Telefunken 1932-1938 radios calibration instructions. All above copies only. Argirios Adamidis, Kampouridi 19, Panorama, Thessaloniki, Greece 55236, E-mail: aadam@it.teithe.gr

SELL/TRADE—PARTS

Transformers for your breadboarding projects such as seen in breadboarding article on pages 32, 33 and 36 of Nov. 1999 *OTB*. Great for regen. and TRF receivers.n For information send SASE. Don Swanson, 8070 Briaroak Dr., Pensacola, FL 32514-7830, (850) 476-5160

SELL/TRADE—TUBES & TRANSISTORS

One extremely rare 1932 RCA 2 inch iconoscope. For serious collectors only. In perfect condition, $45,000/OBO. Albert Abramson, 2224 Beacon Ridge Drive, Las Vegas, NV 89134, (702) 755-7260

WANTED—GENERAL

Zenith collector looking for a Model 835 (or 935, same set, following year)—chrome front tombstone with vertical chrome bars, shadow-graph tuning and a large, white dial—and a Model Super 28 - Zenith's first AC set on the optional, spinet-leg stand. I would pick up within a radius of a days' drive. To restore a 1937 Zenith, I'm in need of a 6" black dial and dial glass common to any of the following thirteen models: 5F134/166, 5S119/126/127, 7D119/126/127/138/148/151/162/168. Thanks for any help. Chris Hicks, RR2, Box 342, Clinton Corners, NY 12514, (914) 266-4257

Want Wireless gear, Grebes, Atwater Kent, Kennedy, Marconi, Murdock and others. Individual pieces or a collection in good condition. Also, earliest tubes, with good filaments. Marc Gottlieb, Box 1112, South San Francisco, CA 94083-1112, E-mail: mgottlieb1@excite.com

Zenith Model 8-S-563 in restorable condition. Dave Ivarson, 5 Church Rd., Collegeville, PA 19426 E-mail: nordstar@bellatlantic.net

GEX-371, X-372, Hallicrafters CR-3000, Ten-Tec 315, RX-10, Mosley CM-1, Heathkit AR-3, American Bosch 440T cabinet. Herman Schnur, 3205 Brick Kiln Rd., Greenville, NC 27858, (252) 752-2264

67 1/2 VDC battery eliminators (AC to DC); Maxell, Lafayette, Radio Shack; Norelco AM-FM Deluxe multi band; working, with external power transformer, AC supply, instructions. Also, White's Radio Logs from the 30s to 50s. A. Sherry, P.O. Box 1051, Riverdale, NY 10471

NC300 4H4-C ballast; XCU300 calibrator unit; late issue foreign QSL Callbook. Gerald Liccione, 118 Hiawatha Trail, Liverpool, NY 13088, (315) 457-7928

Microphones, broadcast gear by Collins, Gates, RCA, Raytheon, Langevin, Western Electric, Neumann, Sony, Ampex, etc. Tube or solidstate. Working or broken. Also tube HI-FI gear, vacuum tubes and speakers. Mike States, Box 81485, Fairbanks, AK 99708, E-mail: mstates@ptialaska.net, (907) 456-3419

Stancor/Chicago PCO/PSO 150, PCC55, PCC200; Triad A-9-J, A-10-J, A-11-J, A12-J; Peerless S-217-D, E-372-Q, G212-Q; 6386/2C51

tubes; any audio equipment by Langevin or Fairchild. Send SASE for list of old books. R. Robinson, POB, 1425, Wallingford, CT 06492, (203) 949-0871, E-mail: richmix@erols.com

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1920s headphones, literature, original headphone boxes, phone plugs and anything headphone related. Thank you. Bob Sukosky, 62 Strong St., Manchester, CT 06040 (860), 646-8857 5 to 9:30 PM EST

Early 1930s small cathedrals, small tombstones (restorable, ok); Also 1920s battery sets, crystal sets, WD-11 tubes (dud). Argirios Adamidis, Kampouridi 19, Panorama, Thessaloniki, Greece 55236

Arvin 517 tombstone chassis, dial cover for a Bendix 5266. Patrick Franzis, 235 Millville Ave., Naugatuck, CT 06770-3848n E-mail: n1ocj@arrl.net

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Vacuum tube Theremin schematics, Pickett N-16 slide rule with instructions, Miller coil #242A (2 needed) and #EL56. Jim Douglas, W6575 Dakota Ave., Westfield, WI 53964

WANTED—INFORMATION

Looking for information on transmitters built by Clough-Brengle Co. I know of two different models; one was a prototype for the Coast Guard and one was built under contract for the US government to be used in CCC camps in the mid 30s. If you have any info on this subject I would sure like to hear from you. I plan to use the information in a future article for the *OTB*. Ron Lawrence, KC4YOY, P.O. Box 3015, Matthews, NC 28106 704-289-1166, email kc4yoy@trellis.net

WANTED—KEY & TELEGRAPH

"The McElroy Collector" still needs a few MacKey bugs. Want early brass nameplate model, and also want model with "Mfd in Boston Mass" cast on left side. Tom French, W1IMQ, 151 Barton Road, Stow, MA 01775n (978) 562-5573, E-mail tfrench@fiam.net

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Oddball speed keys (bugs) for my collection. Weirdo manufacturers and or configurations such as left-handed, vertical, double levers, etc., especially welcome. Price secondary. Gil Schlehman, 335 Indianapolis St., Downers Grove, IL 60515-3119, (630) 968-2320

WANTED—LITERATURE

Radio Boys books. Need four: "To The Rescue", "Aiding The Snowbound", "On Signal Island" and "With Air Patrol". Help me complete the collection. Thanks! Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 27606n (919) 851-1517, E-mail: ekbell@mindspring.com

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Instruction manual or copy of the same for an Eico Signal Tracer Model 147A. Willing to pay reasonable price. Thank you. George Hughes, W1ALL, P.O. Box 1054, Southwick, MA 01077-1054

Need manual or a copy of the schematic for CND-46156 Radio Receiver, a unit of Model RAL-7 Radio Receiving Equipment, Navy shipboard. Further identity: Frequency Range 0.3 to 23 mHz. Unit uses two type 41 and four type 6D6 tubes. Edwin Rybak, W3QAG, P.O. Box 753, Morrisville, VT 05661-0753

Seeking *OTB* Volume 19-2. Greg Dockter, 414 Browning Avenue, Bismark, ND 58501

Need schematic diagrams for restoration of the following sets: Silver Radio, 4 tubes, BC band portable green plastic; Philips Erika RR; RCA 5Q22; Olympic Radio Trubase LP-213; Columbia Electric Int'l AN/SGC 1A; Philco A36 U Tropic; Automatic table radio, 5 tubes with SW/BC; Patterson 8 tube with 2or 4 bands; Silvertone 132-42700; Emerson 324-2; Hamaroneck VOX 5 and TIS 3A; Philco model 3402; RCA 61-X-1Radiola. Jose Antonio Jimenez Sarmiento, Camping Guantanamo, S/N, Tauro-Mogan, 35138, Las Palmas de Gran Canaria, Spain

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RTTY Literature Wanted: "The Teletype Story" original or photocopy (this is a history of the Teletype Corporation published in 1958). Also want RTTY Magazine, 1964 and earlier (published by the RTTY Society of Southern California and Merrill Swan). Also want RTTY Journal back issues, 1963 and earlier and any ARTS RTTY bulletins, or RTTY material/handbooks/etc. by W2BFD and/or ARTS. Will consider photocopies. Don Merz, N3RHT, 47 Hazel Drive, Mt. Lebanon, PA 15228 (412) 234-8819, E-mail: merz.ds@mellon.com

WANTED—MILITARY

I am seeking any of the following WWII Signal Corps items—BC-611 or BC-721 Handi Talkies, AN-190 handheld folding loop antenna, BC-1387 coupling unit (box), CS-156 canvas bag, BX-49 spare parts box. Bill Jewell, 6828 Trinity Landing N., Fort Worth, TX 76132, (817) 377-4664 or E-mail: OldRadios@aol.com

WANTED—PARTS

To buy loudspeaker horns. I have reproducers, but no horns. James Fred, 53553 275 W., Cutler, IN 46920, (765) 268-2214

Amphenol, molded 4 pin tube sockets, either ring mount or MIP type, new or used, 1 to 100 pieces. Have for sale Amphenol molded octal sockets with metal saddle mount, $1. each plus shipping. James Fred, 5355 S. 275W, Cutler, IN 46920 (765) 268-2214

Looking for the following parts: 1 Philco Flyback transformer 32-10106-4; also Philco Model 70 parts set. James Maloney, 1703 Leno Rd., Macedon, NY 14502

Ringer, receiver cover & diaphragm, condenser, generator and batteries for a Western Electric wall mounted hand-crank telephone. Glen Buell, P.O. Box 17, Crown Point, NY 12928

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Looking for some NOS cloth headset cords (preferably black) to restore a few favorite pairs of cans. Marc Ellis, P.O. Box 1306, Evanston, IL 60204-1306; mfellis@enteract.com

WANTED—TUBES & TRANSISTORS

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Western Electric tubes, equipment and literature. Also buying many other tubes, tube manuals, and audio literature. Call toll free or send me your list. Don Singerhouse, P.O. Box 321, New Richmond, WI 54017, Toll free Tel/Fax: (888) 715-8823 E-mail: singtube@frontiernet.net

VACUUM TUBE, *continued from page 65*

and the low leakage non-hygroscopic base were features which were particularly important for this type of service. When type 5693 was used as a DC amplifier, the stabilization of contact potential obtained by seasoning became an important advantage. Use of the suppressor grid as an additional control electrode could be recommended because the suppressor characteristics of this type were held within specified limits.

Types 5691 and 5692 were useful as audio amplifiers or as DC amplifiers and had the same advantage over receiving-type tubes as type 5693. The "Special Red" twin triodes can be particularly recommended for applications in which good balance between the two sections was required. In addition, other features of these tubes made them desirable for multi-vibrators, cascaded amplifiers and for other applications in which uniformity, reliability, and extremely long life are essential.

There was a fourth member of the "Special Red" tube family that was scheduled for release in 1948. This tube was the 5690, a full-wave rectifier. Due to the numerous testing and production difficulties encountered, its release was delayed until 1953. Except for its larger bulb size, it possessed all the qualities of the rest of the "Special Red" tube family,

The long delay in releasing this tube prevented it from attaining the popularity of the rest of the "Special Red" tubes — probably a classic case of missing a "market window." It must have been a commercial failure because it was limited to "quantities on hand" in 1962 and was discontinued in 1967. This makes the 5690 the rarest of the "Special Red" tubes. The rest of the tube family (5691/2/3) was actively promoted in the 1975 RCA Industrial Tubes Product Guide.

The "Special Red" tubes can be readily identified by sight. The 5690 has a T-12 bulb. The 5691 and 5692 are GT-types (T-8 bulb). The 5693 is a standard metal tube (MT-8 bulb) with a red shell. All have unique non-hygroscopic red bases. At the time of their release, in early 1948, the "Special Red" tubes represented the state of the art and remained so for many years thereafter. These tubes certainly merit a place in every tube collection.

ACKNOWLEDGEMENTS

RCA Application Note (AN-129)
George M. Rose (Retired RCA – now deceased)
AWA Members Lud Sibley and John Walker

AMATEUR RADIO

EDITED BY **JOHN F. ROLLINS, W1FPZ**, HC 33, BOX 150, ARROWSIC, MAINE 04530
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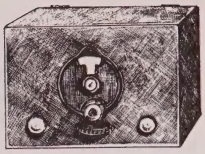

Results of the 2000 Linc Cundall Memorial Contest

This year the Linc Cundall Memorial OT CW contest was moved from the traditional February setting to the last days of January (January 26-27 and January 29-30) in hopes of avoiding the RTTY activity in February. The results, condition wise, were for the most part gratifying except for the contesting on the 160 meter band. The only disappointment was the rather light turnout for the test, but we did have 13 new participants. Several of our members commented on that. A total of 60 logs were returned. Once again Bob, W2ZM, cornered the market with 867 points. Frank, K3DZ was second with 630 points, and Wayne, W5WS/3 third with 558 points. Congratulations all around.

The DX activity bears some comment. At a very late hour, Parker, W1YG decided to try an Irish QTH for the contest. This meant designing and putting together a suitable transmitter and power supply etc., testing same and still traveling to Ireland in time to set up and test before the contest. The transmitter covered all the bands using a pair of 809 tubes in the final. Unfortunately we were not able to alert all of our members to listen for this prize DX. Nevertheless seven contacts were made, five of these on 80 meters and two on 20 meters. Thanks for your super effort Parker.

On the Pacific ocean side, Jun, JH8SST/7 came through again to the West coast using 10 watts. Jun has been an active contest member for a number of years, always with very low power. Cuz, J37XC in Grenada is always active in our contests. This year he outdid himself and made 32 QSOs on three bands covering the east coast, midwest, west coast, Canada, Ireland and England.

The 40 meter band has some interesting observations on the log sheets. The band was quite active in the contest with 338 QSOs but DX activity was nil except for QSOs with J37XC. Cuz made three 40 meter contacts: Pennsylvania, New Mexico and California.

For some reason propagation did not favor East-West dxing.

At the suggestion of Hank, W6OJX, I have compiled some band activity statistics from the contest results. they are quite interesting. The total number of participants was 60 (based on returned logs). Number of QSOs per band broke down as follows:

Band	160	80	40	20
Total QSOs	20	768	338	142

The 80 meter band is obviously the most popular. This is due in part to the large number of simple self oscillators and crystal oscillators in use.

The 40 and 20 meter bands have both had a resurgence of interest with a lot more activity than I have seen in past contests, especially 20 meters. This, in spite of QRM problems on the 20 meter frequency segment in use. We will consider moving this band segment down 10 Kc in future AWA activities.

The 160 meter operations were sharply curtailed by QRM from a 160 meter contest. We may have to live with that if the 160 meter contest becomes a permanent operation. Each year there seems to be more contesting activity. However, in past years AWA participation on 160 has always been low.

Well, there you have it. Once again many thanks to all those who sent photos and notes. Also, I would like to extend a welcome to our new member/participants. Hope to see you all next year.

TOP TEN CONTESTANTS

Call	Points
W2ZM	867
K3DZ	630
W5WS/3	558
KJ8L	546
W2LYH	480
AA9DK	450
KB2PLW	358
W4VBX	252
W6DJX	243
J37XC	192

Call	TX	160	Qsos/Band 80	40	20	Total Points
W-1						
W1YT	'40 6L6 XTAL OSC		18	3		186
W1GIG	'38 MEISSNER		9			81
W1DDW	'28 MOPA		17	11		168
KA1CFQ	'29 HARTLEY		9			36
NE1S	'29 TNT, TRI-TET		11	7	5	176
W1FPZ	'38 VFO, 46, TZ-20		13	11		122
W1TSP	'29 HARTLEY, MOD		27	3	6	177
W-2						
KB2QIU	'38			3		9
W2LID	MOD		21	6	5	75
K2KK	'37 XTAL-6V6-6L6			12		72
W2ZM	'37 PP 809's,'29 TPTG-10, 29 HARTLEY 210		44	22	9	867
W2YIK	'29 HARTLEY-45	1	14	10		166
KB2PLW	'40 6L6 XTAL, MOD		30	23	9	358
N2YR	'29 HARTLEY		5			30
K2LP	'39 ECO-6L6-807-860, MOD		20	10	1	63
KE2O	MOD		21	15	2	80
KB2E	MOD		5		4	28
N2VO	'40 RCA		6	3		36
W2LYH	'36 ECO-6V6-6L6	4	25	17		480
W2ER	'38 GROSS		33			240
W-3						
W3VVS	MOD		8	10		38
K3DZ	'38 PP XTAL OSC, 38 XTAL OSC		2	26	25	630
W30ER	'39 XTAL OSC			12		144
W3HWT	'32 46's, 28 MOPA		4	13		153
W5WS/3	'27 HARTLEY, '34 47-46 PR 46s '41 VFO-3 STAGE DBLR-807	3	38	30	9	558
WB3HLH	'39 6L6 XTAL		12			108
KB3SI	MOD	3	13	7	3	54
W3INV	36 6L6G TRITET			6		54
KD3OR	'38 ECO 6L6G		12	9	2	96
W-4						
K4LJH	'39 ECO 807		1	10		66
W4VBX	'38 ECO 6J7-6K7-6V6-6L6		12	16		252

Call	TX	160	Qsos/Band 80	40	20	Total Points
W-5						
K5CF	'40 THORDARSON		11		114	
W5EU	'39 NATIONAL NTX30		11			85
K5RB	MOD			6		25
WA5VLZ	'39 NATIONAL NTX30		6			54
W-6						
W6DJX	'29 TNT, '39 VFO-807		3	1	12	243
K6TQ	'38 6L6 XTAL-807				2	36
W6TOP	'37 UTAH,'29 HARTLEY		5		8	90
W6ZZ	MOD		2	1		5
W-7						
K2WW/7	MOD				12	42
W7LNG	'38 MEISSNER		2			12
K7YIR	MOD				1	2
W7LOG	'36 XTAL OSC-807		1			9
W-8						
K8JWR	'29 MOPA		10			90
K8FE	MOD		4	14		36
W8KGI	'41 MEISSNER, '42 BC459, '40 CBY 52209		12	2	2	174
KC8DDH	'29 TNT		2			18
KJ8L	'40 MOPA	3	40	20	3	546
W-9						
W9QZ	'29 HARTLEY		21			184
N9CQX	MOD		17	3	5	90
N9TT	'40 BC-375		16	4	2	63
N9EWJ	'29 HARTLEY		1			8
AA9DH	'29 TNT		22	7	13	450
W9POC	'40 6L6-6V6-807		13	7	1	156
VE						
VE3HIE	MOD (2 1/2 W OUT!)		16	7		100
VE3BHW	XTAL 6C5-6F6		16			112
DX						
J37XC	MOD		12	3	17	192
GB2RN	MOD					
EI/WIYG	'38 6V6-6L6-PR 809s		5		2	84
JH8SST/7	'37 XTAL 6F6-6F6-807				1	18

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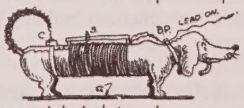

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MUSEUM, *continued from page 76*

been divided into grid sections to identify object storage or display locations. Object identification codes have been devised and marking systems formalized. We need to recognize Data Base Chairman Paul Norder, KG2EP, for his methodical approach to making sure we have a first class system designed and for his implementation plan which is running well.

A slow and cautious approach is being taken on plans for a new museum building on AWA owned property adjacent to the Annex. Next week a final meeting is being held with a builder where we will discuss pricing and other factors. Findings will be reported to the AWA Board of Directors in May.

The AWA Museum has renewed its loan agreement with Mr. Lud Sibley, of Tube Lore fame and co-founder of the Tube Collectors Association, regarding the AWA's collection of tube data from RCA's Harrison, NJ, plant. Lud has done a wonderful job of stabilizing this paper collection that suffered some environmental damage.

A new sign has been erected at the Museum along with the Historical society. Looks great.

RECENT MUSEUM DONORS

Laurence Coster
Early TV camera, receiver, parts
Art DeBruycker W2YGW
Early Hy-Gain two meter handheld
Jack Wenrich K2RY
Heath HW-2036 Transceiver, ARC-3
James Going
MIL equipment; GP-7, BC-654, much more
Gary Morse
300 Vacuum tubes, RX and TX
Kenneth Wise KB2WPO
Very nice HRO-60 with accessories
Edward Gable K2MP
Concord Recordaradio

We also have plans to install a new alarm system to replace the 20 plus year old one that is becoming hard to maintain. Remember the Spring Meet at the Annex on May 6th. Details appeared in the last *OTB*. Happy Spring.

Ed Gable K2MP
Curator, Director
Writing for your Museum Crew

OTB Back Issues

The following back issues of *The Old Timer's Bulletin* are available at $3.00 each postpaid, with a 20 percent discount for six or more issues and 30 percent off for 12 or more. Index to *OTB* volumes 20-34 and *The AWA Review* Volumes 1-8 is free on request with purchase. Please indicate alternative choices when ordering back issues of *OTB*.

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28-3 Dowd Tube Collection/National AGS II
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29-1 Philco 17 Restoration/ZL2JJ '34 Station
29-2 Fada 460 Restoration/3ZO 1922 Station
29-3 Moorhead Tubes I/British '30s TV I
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35-3 Radiola 17 and 18/1929 regen/G&R Valve Co.
35-4 Negatron/Mercury Super 10/The Breting 14/James Millen Memorial Station
36-1 Orrin Dunlap's Lab/Kolster K23/Bush & Lane Radio
36-2 Headset Update Listing
36-3 100 Years of Marconi Radio
36-4 History of Rogers Batteryless Receivers
37-1 T.V.-Dr. Ernest Alexanderson, Part 1
37-2 T.V.-Dr. Ernest Alexanderson, Part 2
37-3 Evolution of the Auto Radio, Part 1
37-4 Reginald A. Fessenden and the Development of Radiotelephony
38-2 DeForest Gang Hits Colorado-Part1/Nathan Stubblefield-Forgotten Pioneer of Wireless-Part1
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MUSEUM NEWS

Hello everyone. Museum activities are warming up, literally. Not a lot of activity takes place at the museum or the unheated portions of the Annex during the Winter and early Spring. Just too cold. There is a lot of planning that takes place and then there is a flurry of activity to implement plans and get ready for the Spring Meet and for the museum opening in May.

I'm really enthused about the transistor display being designed and set up by Allan Pelnatt, KX2H. We also need to thank and recognize Paul Farmer, who responded to my request here in the last *OTB*, for the loan of a Regency TR-1. Paul has offered an as new, working, TR-1 for our use. Thanks, Paul.

Also new is E-commerce by the Museum. Museum volunteer Harvey Cohen, K2EJP, is placing back issues of the AWA reviews on eBay and has been doing a very good business. We are also moving a few non-accessioned items from the junk pile. In using E-commerce, a rule is that no item shall be offered until first offered to AWA members and never at a price less than paid by members.

While recognizing some museum volunteers I feel it is necessary to let you know that a long term tradition continues, albeit quietly. Some of you remember the wonderful restoration work done by the likes of Linc Cundall and many others. This saving of artifacts continues and most recently your staff saved a horribly damaged Paragon DA/RA set. The oak cabinet was so badly damaged (run over by a car, very long and sad story) that replication was the only solution.

In steps George Platteter, AA2FO, who says he can save it. George not only got the correct oak material, but had to make his own routing tool to exactly match the bevel of the original. Then, where do you find original black lacquer? You research and find out dissolving old 78 rpm records gives the precise formula. The resulting finish is outstanding. I defy you to observe the end result and tell it is not a 1922 cabinet. I tell you this for two reasons, one is to recognize George's efforts. I also want to remind folks that donating such items to the AWA museum is a safe bet, that we take our responsibility for the preservation of your artifacts very seriously.

The Data Base Committee continues to meet weekly and to further the cataloging of the collection. The Annex and Museum has

(continued on page 74